SCIENTIFIC AMERICAN

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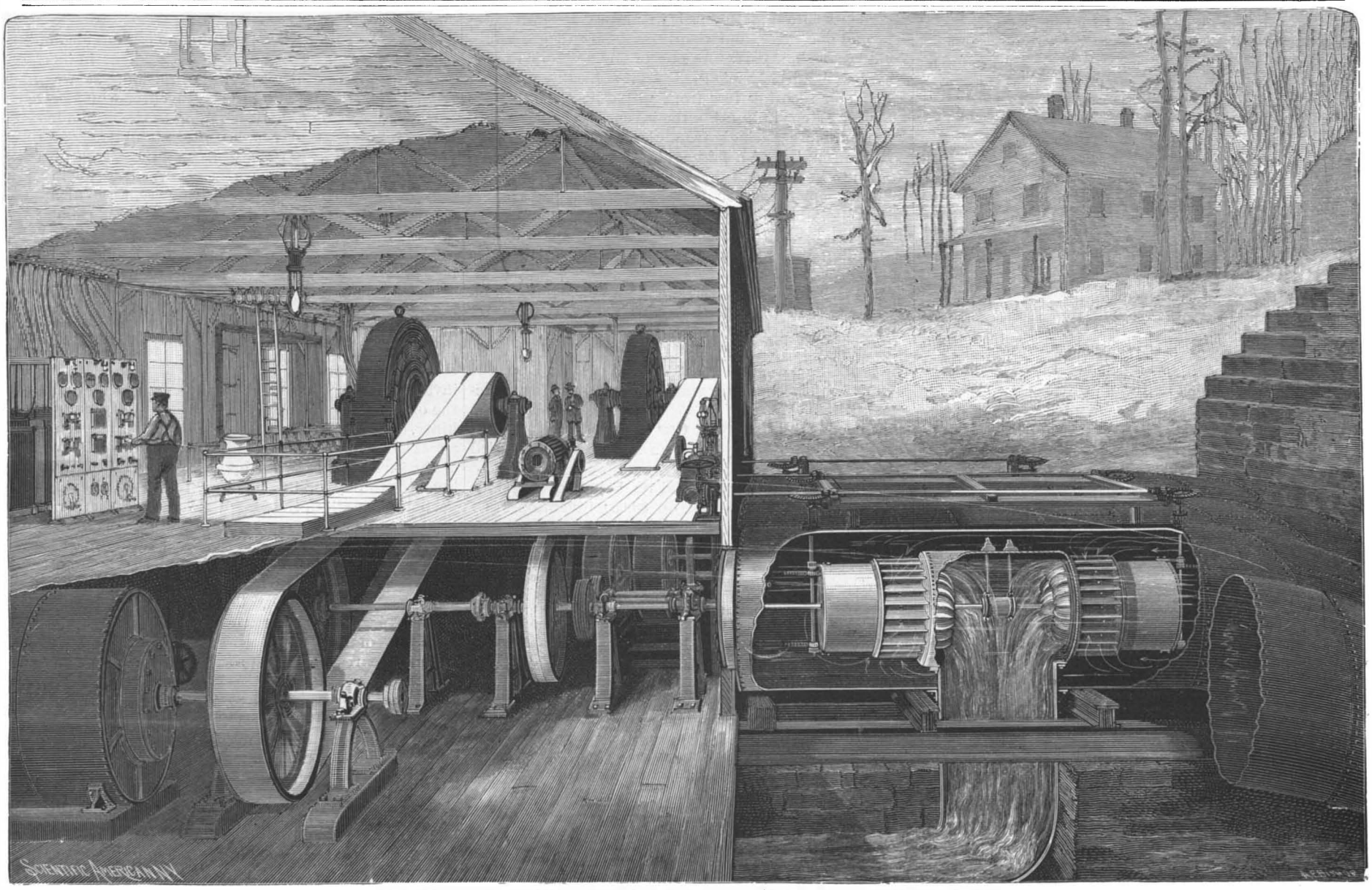
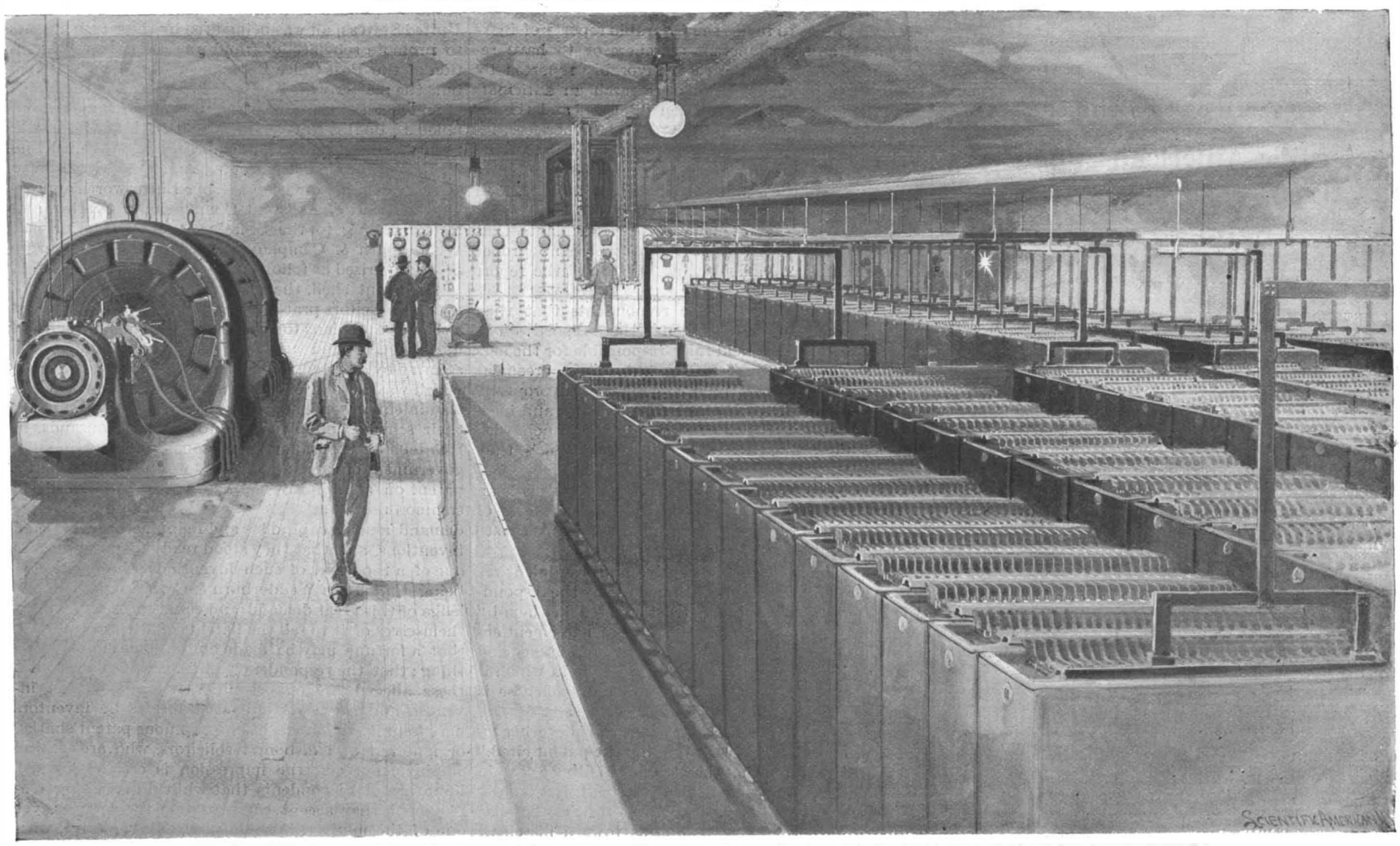


THE TURBINES AND GENERATORS AT FARMINGTON RIVER POWER HOUSE.



STATE STREET STATION, SHOWING THE ROTARY TRANSFORMERS, THE SWITCHBOARD, AND THE STORAGE BATTERIES.

THE HARTFORD ELECTRIC LIGHT AND POWER PLANT.—[See page 253.]

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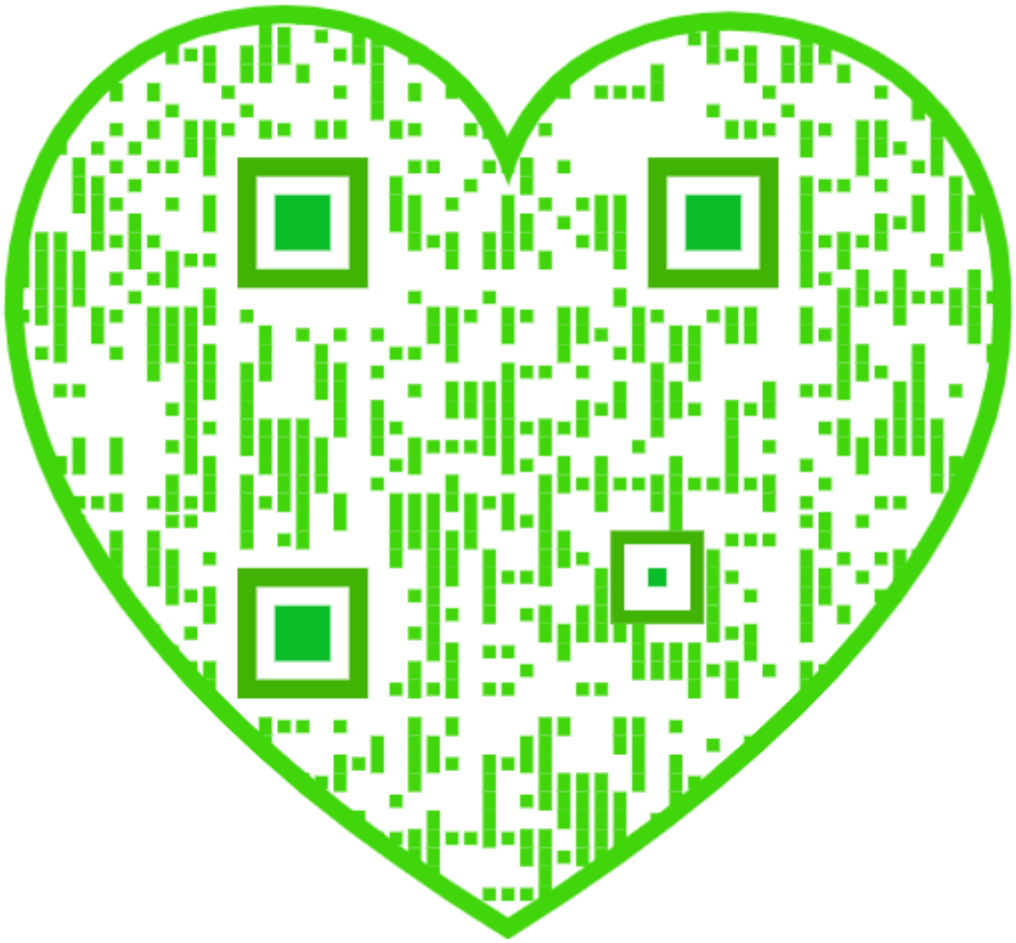

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NEW YORK, SATURDAY, OCTOBER 9, 1897.

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THE WEDDERBURN DISBARMENT.

The full text of the decision of the Commissioner of Patents against Wedderburn & Company is at hand, together with the final act of the Secretary of the Interior, whereby the disbarment of this firm is officially sanctioned. Assistant Commissioner Greeley's report refers to the work of a certain "expert Hughes, chief of the sales department," whose office it was to "place values on inventions," a work, it appears, which was done "at sight, sometimes even without sight of the invention or full description of it." Regarding this arrangement, the decision says:

"This valuation scheme as carried out by the respondents through Hughes is in and of itself fraudulent and deceptive, and clearly amounts to gross misconduct on their part. As one of the steps in the respondents' adroitly planned and skillfully executed scheme for securing fees from would-be inventors, as one of the steps in hunting the inventor for his money, it is even more glaringly fraudulent.

"The sending of a false valuation in a single case known to be or which should be known to be without value, where by reason of such valuation the inventor might be induced to part with a sum of money, indicates at least gross negligence. To make a practice of sending out false valuations indicates deliberate purpose."

"By these methods the respondents have induced inventors to send to them their efforts at invention, together with sums of money, for the purpose of having preliminary searches made in each case to determine the probable patentability of the invention. Upon the result of this preliminary search depends the future action of the inventor."

It is shown by the report that the average number of searchers employed by the firm in 1896 to 1897 varied from three to thirteen; yet—

"These searchers, it is stated on behalf of respondents, in two years reported on 33,000 inventions. Of these the searchers reported unfavorably on 60 per cent or more, or 20,000 in round numbers. That this insufficient number of searchers, many of whom were inexperienced and some of whom were incompetent, were able to find anticipating reference in 20,000 cases shows what kind of crude conceptions and supposed inventions were gathered in by the respondents through their advertisements and their pamphlets and papers. It shows that large numbers of persons were falsely induced by the respondents to believe themselves to be inventors, and were led to send to the respondents fees which never should have been sent.

"This raising of false hopes is demoralizing to these persons. It has no other purpose than to secure from them money for searches, money, if possible, for applications for patent, money for foreign patents, money for advertising, money for 'write-ups' in the National Recorder, and money for appeals. It shows a reckless disregard of the rights of people, a disposition to secure money by any misrepresentation, any pretense, however false. . . .

"This failure to revise the favorable reports of inexperienced and incompetent searchers or to have researches made upon the cases favorably reported by them, when by such revision or research an anticipating reference might have been disclosed and the inventor thereby prevented from paying further fees, indicates not only reckless disregard of the rights of the client and indifference to the agreement entered into with respect to the search, but deliberate and intended fraud."

Referring to the statement of the defendants that the sending of a favorable report where no proper search had been made was a "mistake," the report says:

"I cannot agree with the respondents that they should not be held responsible for these reports. The respondents must be held fully responsible for the acts of their employes, and were bound by their agreement with their clients to have these searches made properly. Their failure to do so in these cases is gross and inexcusable negligence. The fault lay not so much with the searchers as with the system under which they worked."

The defendants, in the cases in which they made an "unfavorable report," did so in a particular form of letter, of which the Assistant Commissioner has this to say:

"It is upon its face a deceptive and fraudulent report. Its deliberate and continued use by the respondents was in violation of the trust reposed in them by their clients, in violation of the express agreement entered into with their clients, in violation of honesty and common decency. The report in the cases in which it was sent is a false and lying report. Its purpose is evident from its language. It was intended to deceive and mislead the client, to induce him to believe his invention patentable, notwithstanding the patent cited."

It is further stated that the attorney in filing a certain application "is false not only to his client, but is false in his duty toward this office. That the attorney has a duty toward this office as well as toward his client cannot be questioned. He is to assist the Patent Office in doing justice toward his client and justice toward the public. He cannot be a party to an attempt to secure a patent for what he knows to be old, an attempt to take from the public what has become public property, any more than he can permit the office to refuse to his client the protection to which that client is under the law entitled."

Regarding the sending of medals, the report says in certain cases "the medals and letters were sent to the clients with the full knowledge and approval of the respondents, for the purpose of inducing the payment of further fees in cases in which the so-called unfavorable report citing a reference had not secured a response from the client as quickly as was deemed desirable by the respondents."

Again, we read: "There can be no reasonable doubt that the silver medal scheme was fraudulent in its conception and fraudulent in its execution. It was intended to mean one thing to the inventor who received the medal and quite another thing to the respondents. It was intended that the inventor should believe the medal and certificate to be what on its face it purported to be—a reward of genius, a certificate that his invention has been selected by some competent and disinterested board of awards for its remarkable importance. . . .

"Such a scheme has no place in the legitimate business of an attorney."

However, "Having by false and misleading advertisements attracted the attention of the would-be inventor and secured his address; having sent him the various pamphlets and papers before referred to, which are deceptive and misleading as to the value of simple inventions; having stirred the inventor to activity by the offer of free advice as to patentability and salability, and having in response to his inquiry given him a recklessly false and misleading estimate of the value of the invention; having by these means induced the inventor to pay for having a search made; having reported the result of the search favorably, whether properly made or not, or having sent the inventor the false and misleading unfavorable report letter, as the case may be; having, if deemed necessary to secure an early response, sent the inventor a silver medal and its accompanying letter; having by the use of any or all of these means secured from the inventor the first installment of fees for the preparation of application papers, the respondents proceeded to prepare the necessary papers."

The report says in conclusion:

"In my judgment the respondents, John Wedderburn and John Wedderburn & Company, have been guilty, not only of gross misconduct in particular cases, but of a long-continued, systematic and deliberate course of gross misconduct. In justice to this office and in justice to the public, these respondents should be refused further recognition as patent agents or attorneys, and *the facts disclosed should be reported to the district attorney for such action as the delinquency of the respondents and the safety of the community demands.* [The italics are ours.] The fact that the United States mail was being used by these respondents to promote schemes of fraud was called to the attention of the Post Office Department many months ago, but the matter was, I understand, placed in the hands of an official of that department, who, for some reason, failed to do his duty. He has since, I am informed, been dismissed and criminal proceedings against him for misconduct in office are pending."

In the decision of Commissioner Butterworth approving the report of Assistant Commissioner Greeley, and recommending to the Secretary of the Interior that Wedderburn & Company be disbarred, the charges are summarized as follows:

"In a nut shell, the charges are that the respondents, as solicitors practicing before the office, concocted a scheme and plans to impose on, deceive, and defraud unsuspecting and unwary persons throughout the country by a system of advertising and correspondence which was false in suggestion, misleading in fact, and fraudulent in tendency and purpose; that the effect of their scheme and plans was to induce thousands, in fact tens of thousands, of persons to believe that the government of the United States would readily grant a patent on any improvement on articles or utensils in common use; that there was and is just now an active demand among capitalists and manufacturers for such inventions, and that they stood ready to purchase any one of a thousand of such inventions; the suggestion being that John Wedderburn & Company had knowledge of this great demand and could successfully avail themselves of it to sell the patents of their clients, and that a fortune may be made out of some simple little thing; that the respondents, while calling attention to these alleged rare opportunities, felt anxious lest inventors and those who are struggling to be inventors may fall into the hands of unscrupulous patent sharks, or ignorant and dishonest solicitors, who are seeking employment; and the impression is created by the literature of respondents that while in soliciting employment they accept compensation for services, yet one of the motives, if not a controlling motive, with them was to protect and aid struggling inventors, and save them from being entrapped by captivating and

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alluring advertisements which inspire delusive hopes and suggest promises of gain that can never be realized; and that while evincing in their publications this tearful solicitude for the honest, well-meaning, and wholly unsuspecting person who is so liable to be wronged by sharpers, the respondents themselves were in fact doing the very thing they so feelingly deprecate and condemn; and indeed issued the very character of literature and published the kind of advertisement they criticise and denounce; and have so successfully employed these means and agencies that more than 32,000 persons have been induced to establish the relation of clients of John Wedderburn & Company, and that of the 33,000 clients, less than 1,600 applications have been allowed."

Prior to his conclusion, the Commissioner lays stress upon the fact that "if the business and the methods and practices of the respondents had been tolerable and of a character that could be defended, the respondents and their backers and indorsers would have made all haste to make known, not only to the Commissioner and to the Secretary, but to the public that was interested to know, that they were carrying on a *legitimate* business in a *legitimate* way; but instead of that they have made substantially no showing at all, either in extenuation or defense of their offenses or in answer to the questions propounded, which were rendered necessary by reason of the facts hereinbefore recited, and which were not answered, nor was one of them answered."

The final clause of the decision is as follows:

"My conclusion is, and I so decide, that John Wedderburn and John Wedderburn & Company have, as solicitors before this office, been guilty of gross misconduct, and that they should be disbarred from practicing before the Department of the Interior, and I recommend that the honorable Secretary so order."

The following is the letter of the Secretary of the Interior confirming the decision of the Commissioner of Patents:

DEPARTMENT OF THE INTERIOR,
WASHINGTON, September 30, 1897.

THE COMMISSIONER OF PATENTS:

Sir: I have examined with great care your report on the John Wedderburn and John Wedderburn & Company cases, together with the report of Assistant Commissioner Greeley, and herewith return both reports, expressing my full approval of the reports of your office. I request that when the reports are printed you will transmit a copy to the Postmaster-General and that his attention be especially directed to the use that has been made of the United States mails by the John Wedderburn Company.

Very respectfully,
C. N. BLISS, Secretary.

NOTE.—Under the regulations of the Patent Office, the disbarred firm cannot prosecute pending applications or file new ones. The only remedy available to their clients for the recovery of fees wrongfully or fraudulently obtained, as suggested by the Assistant Commissioner, is to bring the facts to the attention of the District Attorney of Washington, who can bring an action against the disbarred firm to recover. Those who do not desire to take this step have the right to transfer their business for further prosecution to registered and approved attorneys.

IMPENDING CHANGES IN UNITED STATES PATENT LAW.

On January 1, 1898, important changes in the patent laws of the United States will take effect. These changes will bear principally upon the relation of applications for United States patents and grants made upon such applications to foreign patents for the same invention. In a former number (issue of March 20, 1897) we have commented at length upon the latest amendments to the patent law. We would now draw the attention of our readers, especially those residing abroad and holding foreign patents for inventions not protected in this country, to the necessity of filing United States applications covering such inventions before January 1, 1898. After that date, applications for United States patents may be rejected if filed more than seven months after the date of filing the earliest foreign application. Under the present law, however, valid United States patents may be obtained for inventions patented abroad several years ago, provided the foreign patent is in force at the time the application for the United States patent is filed. This provision is of interest and advantage, not only to the holder of the foreign patent, but to the American manufacturer or capitalist who desires to secure in this country the monopoly for an invention patented abroad and not so protected here.

PRESERVATION OF THE PALISADES OF THE HUDSON.

Perhaps in all America, if we except Niagara Falls, there is no object of natural beauty and grandeur that enjoys a wider reputation than the majestic Palisades of the Hudson. This extended line of natural ramparts, which looks down on one side upon the fertile valleys of New Jersey and on the other watches the swift encroachment of New York City upon the wooded heights of Manhattan Island and the rolling country to the north, would be noted for its natural beauty even if it were far removed from the haunts of civilization. Standing, as it does, at the very gates of the second greatest city of the world, it has acquired a reputation which is world wide and grows with the passing years.

Everyone who has had occasion of late years to pass up or down the Hudson River must have noticed that the aspect of the Palisades is being rapidly changed by the numerous quarries which have been opened along its face. Where this has been done, the soft brown and gray tints of the cliffs have been defaced by the dirty gray patch which indicates a quarry, and the many-tinted foliage which clothes the base of the cliffs has given place to unsightly stone heaps, wharves and hoisting derricks.

It has been suggested that on account of its commanding height this ridge of rock would be a menace to the safety of New York if it should fall into the hands of an enemy, and steps have been taken to interest the government in the question of its reservation for the emplacement of guns and for general military purposes. Another scheme suggests that the government purchase a strip of land along the river from Fort Lee to Piermont, wide enough to include all the natural features which are threatened, and preserve them from future depredations. A third proposition contemplates a joint purchase by the States of New York and New Jersey. Of these propositions the first is opposed by military men, on the ground that the heights have no such strategic value as would justify their fortification. An attack on New York is never likely to be made by land and by way of the Hudson Valley; the city is most vulnerable on its seaward side, and the proper place for defensive works is at Sandy Hook and on the Sound. Nor is it within the province of the government to undertake the work of preservation as such. The case of the Yellowstone and Yosemite Parks is not in point, inasmuch as these lands were already in the possession of the government.

It remains then for the two States affected to undertake the work. They are about equally interested; for although the larger part of the Palisades is in New Jersey, its natural beauties are only visible from the New York side of the river.

The agitation of this important question, which, although technically a State matter, has sentimental grounds which make it of national importance, is being taken up by the women's clubs of New Jersey. It has been proposed to build a continuous drive at the foot of the cliffs from Fort Lee to Piermont, a distance of thirteen miles, thus affording, with the present Hudson County Boulevard, a continuous driveway nearly thirty miles in extent. The idea is attractive, though we fear that the cost would be prohibitive. Whether the drive be built or not, the purchase and care of this truly magnificent wall of rock could certainly be carried out for a sum which would be moderate in proportion to the good work achieved.

THE NAVAL DRY DOCK PROBLEM.

There is no problem connected with the naval affairs of the United States of such paramount importance as the construction of adequate dry docks. Unfortunately there is no naval problem regarding which the public is so ignorant and apathetic. To awaken an intelligent interest in the matter has been the endeavor of every writer and journal of importance in the country; but the effort proved futile until the country was subjected to the humiliation of having to send its finest battleship to a British dockyard to have its bottom scraped and painted.

Ridiculous as the situation was, it served to teach the country the absolute necessity of providing dry docks for our navy if that navy is to be available in time of war. The dry dock is as much a concomitant of the modern warship as her engines or fuel. In time of peace the fouling of the steel hulls necessitates docking and cleaning at intervals of a few months, and what little experience has been gained of the behavior of modern warships in action shows that an engagement of any importance will almost certainly necessitate the subsequent docking of many of the ships engaged.

The board of experts which was recently appointed by Admiral Bunce to inquire into the docking requirements of the present and prospective navy has reported that ten new docks should be constructed at a total cost of $11,075,000. We have at present eleven such docks, of which only three can accommodate the largest battleships. With the construction of the new docks we would possess twenty-one altogether, none too many, if we consider the probable increase of the navy in the near future.

Of the total 622 dry docks in the world, about 348 are owned by Great Britain, and of these 266 are situated in England, Ireland, and Scotland. So essential does that country consider the dry docks to her commercial and naval supremacy that she possesses as many as 10 in Australia, 15 in China, 30 in India and the East Indies, and in Canada and British Columbia there are 12. At the great naval station at Portsmouth there are nine dry docks with 33½ to 41½ feet of water on the sills, and the other great dockyards are all liberally supplied. Now, although our needs do not call for any such provision as this, it is nevertheless certain that our recent naval activity has greatly outstripped our dry dock accommodation.

The report states that while an outlay of $11,075,000 is recommended, there is no urgent necessity for constructing more than five of the docks at present. It is suggested that the amount — $5,775,000 — needed for these should be voted in annual installments, as is now done in the construction of the new battleships and cruisers. The list of the proposed docks is as follows: At Boston, one concrete dock 700 feet long, $1,500,000; at New York, one concrete dock 500 feet long, $1,200,000; at Norfolk, one concrete dock 500 feet long, $1,100,000; at Port Royal, improvements, $25,000; at New Orleans, floating graving dock, $750,000; at Mare Island, one concrete dock, 500 feet long, $1,100,000. Total, $5,675,000. In addition to the docks urgently needed, the board recommends that structures be built at these places: At New London, fresh water basin, with dock, $1,000,000; at Newport News, a steel floating graving dock, $650,000; at Tortugas, a steel floating graving dock, $650,000; at San Francisco, concrete dock at Yerba Buena, $1,500,000; at San Pedro, concrete dock 700 feet in length, $1,500,000. The report also states that ultimately dry docks should be constructed at Pensacola, Florida, and Galveston, Texas.

It will be noticed that the materials of which our existing dry docks have been built, viz., stone and wood, is not recommended for the new structures, steel and concrete taking their place. As regards concrete, it may be said that if the work is well carried out a dry dock of this material has all the advantages of solidity and permanence offered by one of granite without the drawback of excessive cost. The difference in cost is great; the proposed concrete dock at Mare Island is to cost but $1,100,000 against the reputed cost of $4,000,000 for the present stone dock. Moreover, a concrete dock can be built in considerably less time.

There will be objections raised against the complete abandonment of the timber construction by those who have faith in this system. But while it is true that there are timber docks that have been giving good service for from 30 to 40 years, there have been failures, or partial failures, like that at the Brooklyn navy yard, which render the system hazardous in a work of such pressing necessity as the speedy provision of docks for a nation's navy.

An even greater innovation would be the construction of steel floating and graving docks, as proposed. The docks would compare favorably in cost with the discarded timber docks, the estimate of $650,000 being about equal to the cost of the Brooklyn dry dock No. 3, and probably less than the latter structure will have cost by the time it is put in serviceable shape. It also has the advantage of being movable, at least within sheltered waters.

The policy is a liberal one; but not more liberal than the situation demands, and it is sincerely to be hoped that Congress will act promptly in placing the new construction under way.

CLIMATE AND CRIME.

The public press has lately given much attention to the subject of the relation between weather and crime, says the Monthly Weather Review. This seems to have started with a private communication from some Weather Bureau observer and has greatly interested every one. A preliminary collection of statistics seems to indicate that crime is more prevalent in hot weather.

The Chief of the Weather Bureau has expressed his opinion that it is utterly wild to contemplate at present the possibility of issuing predictions of prevalence of crime, and he has no intention of attempting it. In fact, there is no official investigation of the subject being made or contemplated in the Weather Bureau and no legal authority for doing so, even if it were considered desirable, which it is not. The statistics of disease have generally shown a very broad connection between climate and disease and the investigation of that subject is ordered by Congress, but that has no official connection with crime. The discussion of such difficult subjects is a matter for the careful study of statistics by physicians, and any conclusions that may at first seem to be justified need to be checked by later investigations before they can be practically applied to the public welfare.

PLATINUM AND GOLD TONING.

Kastner suggests the following treatment for matt solio paper, and states that it gives pure black tones. The prints are first toned in:

Solution of chloro-platinite of potash (1:100)	30 parts.
Potassium choride	2 "
Water	1000 "

till they assume a bluish violet color, and they are then further toned in a bath of:

Ammonium sulphocyanide	20 parts.
Citric acid	20 "
Chloride of gold	2 "
Water	1000 "

After washing, the prints are fixed.—The British Journal of Photography.

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BURGLARS' TOOLS.

There is progress everywhere! The art of the burglar no longer knows any limit. The modern cracksman has not yet found any method of delicately and noiselessly carrying off the huge safes with ironclad doors that are now employed in offices and banks, but he succeeds in opening them with art and skill, without having recourse to the vulgar jimmy, and in utilizing simple and appropriate tools. He cannot easily displace the safe, and the door resists him; so he applies a drill to the latter, and in a few revolutions cuts out a disk from 4 to 6 inches in diameter that is wide enough to allow him to insert his arm and help himself to the

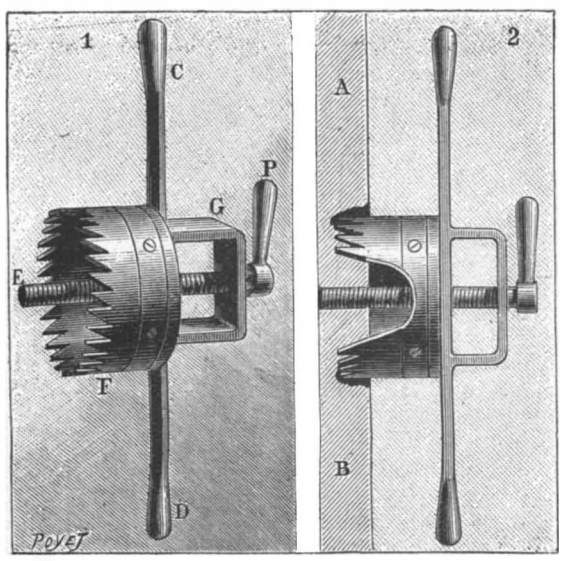


Fig. 2.—IMPROVED BURGLAR'S DRILL.

contents of the safe at his leisure. We cite upon this subject an example that has recently been communicated to us by Mr. G. Gaubert, of Marseilles, one of our subscribers.

One night in the month of November, 1896, between 11 and 1 o'clock, some of the professionals of which we have just spoken made an attack upon the safe of the Picon establishment at Marseilles. Fig. 1 represents the details of the scene that must have taken place.

Two burglars are drilling the safe, while another stands at the door to keep watch. Fig. 2 shows us on the one hand the improved drill that was employed and, on the other, the same apparatus inserted in the door of the safe. The rascals first drilled a hole one or two inches in diameter and of a certain depth, by means of a

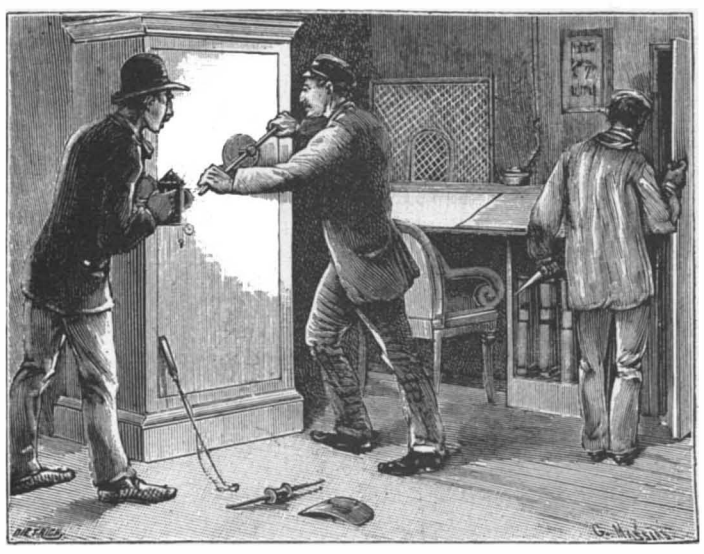


Fig. 1.—BURGLARS DRILLING A SAFE.

hand brace, at the level of the lock, and afterward tapped the hole so that there might be screwed into it a threaded rod, E, provided with a handle, P, at its extremity. The drill, properly so called, consisted of a steel plate ring, F, provided with saw teeth at one of its edges. This ring was held by a transverse rod to which was fixed a vertical lever, D C, and a bridge, G. The threaded rod, E, which was first screwed into the door, served as an axis of rotation. Upon this axis was fixed the drill, F, and it only sufficed to maneuver the lever, D C, in order to cause the saw teeth to bite the plate of the safe.

After a short period of silent work, a disk was detached and came out with the tool. The safe then no longer offered any resistance to the burglars.

It is well to make known this new process of attacking safes. A man forewarned is forearmed. An operation of this kind is not always applicable, since it necessitates a certain amount of time and various preparations. And one might, at all events, reveal it at the proper moment by electricity, in having recourse to a sentinel who rarely sleeps. It does not suffice to drill a hole to reach the lock, for the door of the safe must be opened; and by this fact alone an alarm may be rung. And if burglars were content to remove what is in reach of their hands and quite near the aperture, it would still be possible to obtain warning of their work by an electric signal.—La Nature.

Science Utilizes All the Ox.

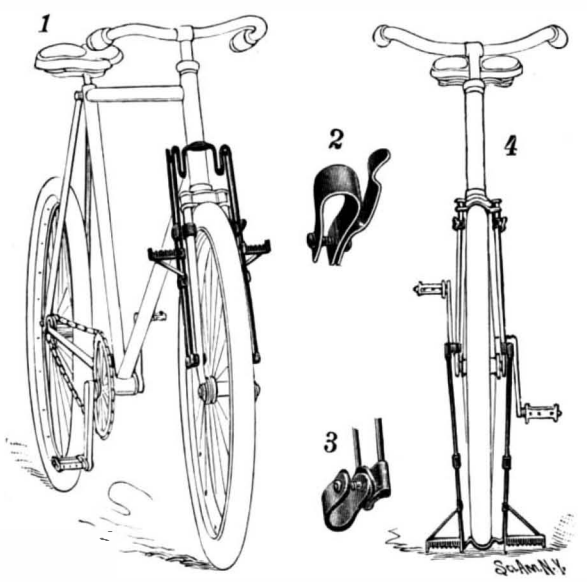
In an article on the "Wonders of the World's Waste," William George Jordan, in the October Ladies' Home Journal, details how science at the present day utilizes the ox. "Not many years ago," he says, "when an ox was slaughtered forty per cent of the animal was wasted; at the present time 'nothing is lost but its dying breath.' As but one-third of the weight of the animal consists of products that can be eaten, the question of utilizing the waste is a serious one. The blood is used in refining sugar and in sizing paper, or manufactured into door knobs and buttons. The hide goes to the tanner; horns and hoofs are transformed into combs and buttons; thigh bones, worth eighty dollars per ton, are cut into handles for clothes brushes; fore leg bones sell for thirty dollars per ton for collar buttons, parasol handles and jewelry; the water in which bones are boiled is reduced to glue; the dust from sawing the bones is food for cattle and poultry; the smallest bones are made into boneblack. Each foot yields a quarter of a pint of neat's foot oil; the tail goes to the soup; while the brush of hair at the end of the tail is sold to the mattress maker. The choicer parts of the fat make the basis of butterine; the intestines are used for sausage casings or bought by gold beaters. The undigested food in the stomach, which formerly cost the packers of Chicago thirty thousand dollars a year to remove and destroy, is now made into paper. These are but a few of the products of abattoirs. All scraps unfit for any other use find welcome in the glue pot or they do missionary work for farmers by acting as fertilizers."

Lightship Instead of Lighthouse at Hatteras.

The Lighthouse Board has sent out a notice that the dangerous Diamond Shoal off Cape Hatteras will soon be marked by a first class vessel, bearing two powerful electric masthead lights and a fog siren that will blow a blast audible twelve miles in the heaviest weather. Certain members of the board, however, think the placing a vessel there is hazardous in the extreme, and will place in jeopardy the lives of every man on board of her. Captain Evans believes that a big lighthouse should be constructed on the shoal, and says: "There is no chain that can be forged that will hold No. 69 on Diamond Shoal for any length of time. There is a current at Diamond Shoal which sends the sands shifting around at a terrific rate and in a short time will cut any chain, or weaken it so that the first heavy gale will cause it to part. When that happens the Diamond Shoal lightship will almost certainly drift ashore and the sixteen men on her will be lost. I have seen a buoy chain on that shoal worn as bright as nickel, and so thin that you could part it with a slight blow. In my opinion, this experiment of the government will prove costly." Congress failed to provide the amount of money required for the lighthouse, and a majority of the board, therefore, decided to try a lightship. The new vessel will be the most powerful ever built for the service. She will be anchored in thirty fathoms of water, about fifteen miles from the present Hatteras light, and inside of the ledge over which the water deepens to 100 fathoms. She will display simultaneously, from three lens lanterns encircling each masthead, a fixed white light for twelve seconds' duration, followed by an eclipse of twelve seconds. In each lantern there will be a hundred candle power incandescent light. These lights will be fifty-seven feet above the water, and on a clear night should be visible thirteen miles. Provision has been made in case the electric apparatus breaks so that white fixed lights without eclipse will burn. No. 69 has a flush deck, two masts, a smoke pipe, and fog signal between masts. Her hull will be painted red with the words "Diamond Shoal" in large white letters on each side. During thick or foggy weather a 12 inch steam chime whistle will sound blasts of five seconds' duration, separated by silent intervals of forty-five seconds. If 69 weathers the gale this winter, the Lighthouse Board will be satisfied that the experiment is a success.

A BICYCLE SUPPORT AND FOOT REST.

The illustration represents a device which can be readily applied on the ordinary styles of bicycles to serve as a foot rest for the feet of the rider while coasting, and which may be turned down to support the bicycle in a vertical position when not in use, the wheel and support being securely locked together to prevent the machine from being stolen. The improvement has been patented by August Zintgraff, of No. 48 West Eighty-third Street, New York City. Fig. 1 shows the attachment in position to form a foot rest for the rider and Fig. 4 shows it in use for supporting the machine, Fig. 2 illustrating a spring catch to hold it in place when forming a foot rest. Near the lower end of each of the members of the front fork is a clip, shown in Fig. 3, secured by a set screw, and connected by a pivot with a clip adapted to clamp two rods forming the frame of the device, adapted to be locked in the upper position by a cam catch and the spring catch, the frame swinging on the pivot to the upper or lower position. On the two rods of each frame slides a bracket with teeth, as on the usual foot rests, eyes on the inner ends of the bracket braces being adapted to engage a clamp adjustable at any desired height to bring the brackets in proper position to suit the convenience of the rider. The eyes are also adapted to engage notches in the rods near their free ends when the frame is down, to prevent the brackets then slipping upward. At the outer ends of the frame are transverse rods with right and left hand screw threads, engaged by a turnbuckle, to permit of moving the frames toward or from each other, according to the thickness of the tire extending between them, and these transverse rods have upward extensions adapted to be connected with each other by a bar passing between adjacent spokes of the wheel, the bar being connected at its free ends with a padlock, to fasten the frames and the wheel together, thus preventing unauthorized persons from riding off with the wheel. According to a modified form of the device

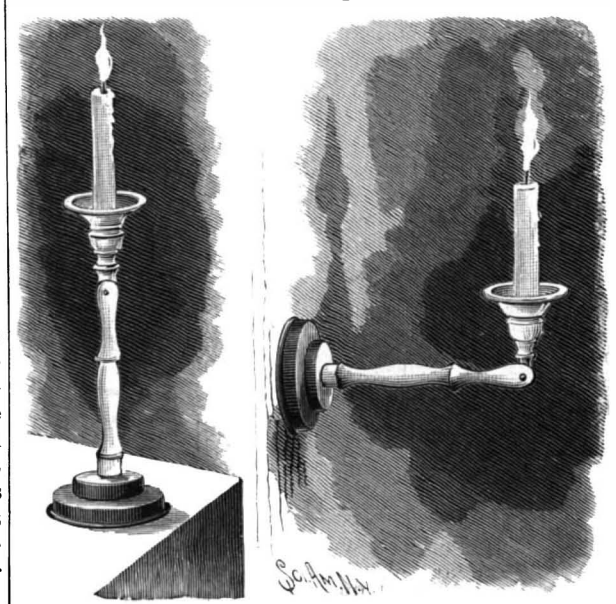


ZINTGRAFF'S BICYCLE ATTACHMENT.

the foot pieces are curved, so that when the frame is in an uppermost position they may be used as a bundle carrier.

PNEUMATIC CANDLESTICK.

The candlestick herewith represented is very ingeniously conceived. It may be placed upon a table or applied to a wall. An ingenious system of jointing renders it practical for the two uses shown in the figure. The part that carries the candle is therefore movable and is capable of making a right angle with the stand. Fixed upon a table, bracket, etc., it serves as an ordinary candlestick, but with the advantage that, being adherent, it cannot be overturned; hence no danger of fire, and no spots from melted wax. In order to fix it to a mirror, piano, wall, window pane, etc., it suffices to place even with the rubber the movable metallic disk situated in the center of the vent, so as not to cause a vacuum in advance. The rubber disk is then moistened with the finger, and the candlestick, having been applied to the object, is screwed up. The air becomes rarefied and the candlestick adheres perfectly. In order to remove it, it is only necessary to unscrew it, when it will at once become detached without necessitating any pulling that might injure the object to which it is attached. Let us add that the mechanism is so simple that there is not the least danger of its getting out of order.—La Vie Scientifique.



PNEUMATIC CANDLESTICK.

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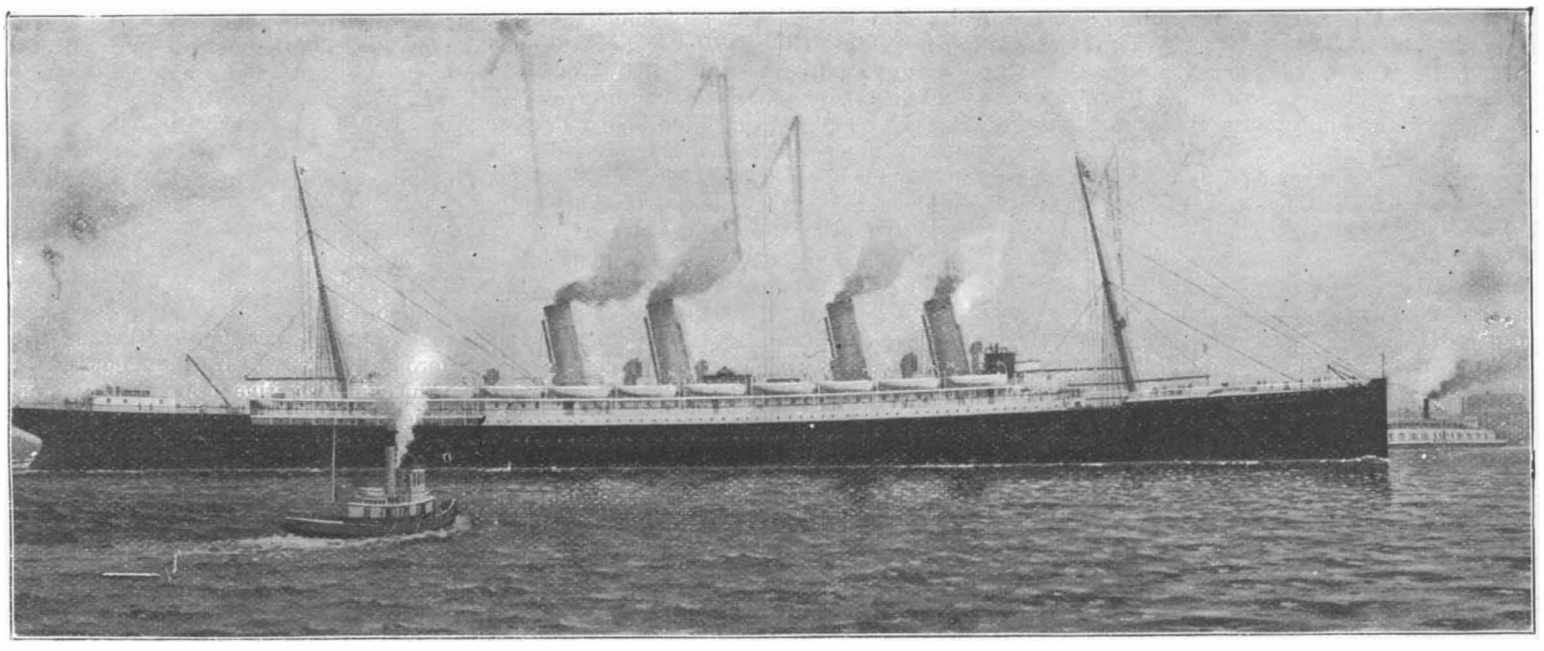
THE LATEST GREYHOUND OF THE ATLANTIC.

The truly splendid performance of the Kaiser Wilhelm der Grosse, of the North German Lloyd line, on her maiden trip, has fully justified all the expectations of the past few months. She passed the Needles at 2:30 A. M. on Tuesday, September 21, and covered the Southampton route of 3,050 knots in 5 days, 22 hours and 35 minutes—an average hourly speed for the whole trip of 21·39 knots. The best previous run was made by the St. Paul, of the American Line, in August of last year, when the distance was covered in 6 days and 31 minutes. The longest day's run was 564 knots, which is two knots more than the best day's run of the Lucania. The highest average speed to the credit of an Atlantic liner is that of the Lucania, which has maintained 22·01 knots for the whole passage from Queenstown to New York.

The average hourly speed for the day on which the Kaiser Wilhelm made 564 knots was 22·75 knots; and it is confidently expected that, when she has been running long enough to work the engines and boilers up to their best performance, the new boat will be capable of making 570 knots per day. Considering what excellent work has been done on the maiden trip, the expectation is reasonable. If she could maintain this speed over the Queenstown route, the trip could be made in about 4 days and 21 hours, and the Southampton route could be covered in 5 days and 8 hours. This, of course, will scarcely happen, as such high daily averages can only be maintained under exceptional weather conditions, such as rarely, if ever, occur for a whole trip. How greatly tidal and weather conditions affect the speed of these ships is shown by the fact that the Lucania on one occasion ran from Queenstown up to the Mersey bar, a distance of 240 knots, in exactly 10 hours, which would give her an hourly average of 24 knots. It was found on inquiry that both tide and weather were in her favor, and that every effort was made to reach the bar before low water.

The maximum indicated horse power of the Kaiser Wilhelm was 28,430; the coal consumption was 500 tons per day, the revolutions of the propeller 77 per minute. She has a bunker capacity of 4,950 tons, and can carry enough fuel to serve for the round trip. The engine and boiler room staff comprises 90 stokers, 75 coal passers, 18 oilers and 17 engineers.

The principal dimensions are as follows: Length, 649 feet; beam, 66 feet; depth, 43 feet; tonnage 14,000 and displacement 20,000 tons. She thus exceeds every ship afloat in all her dimensions except one, the huge freighter Pennsylvania, of the Hamburg-American Line, being of about 3,000 tons greater displacement when fully loaded. The following comparison with existing ships and with the Great Eastern, now broken up, and the Oceanic, now building for the White Star Line, will be timely:

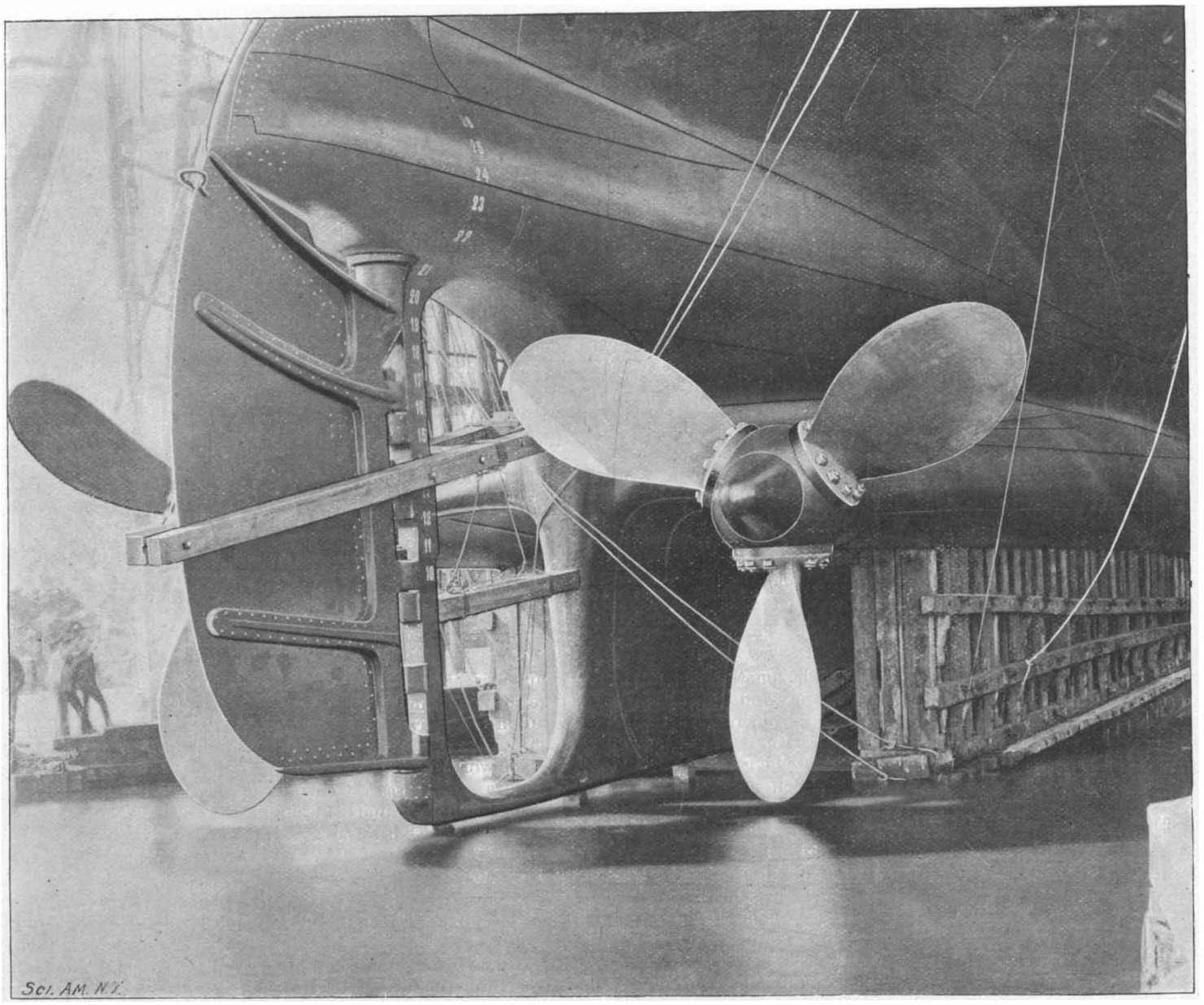


THE KAISER WILHELM DER GROSSE.

	Length Over All.	Beam.	Depth.	Displacement.	Horse Power.	Sea Speed.
						Knots.
Great Eastern...	692 feet.	83½ feet.	58 feet.	32,160 tons.	6,000	11
Lucania	620 "	65¼ "	43 "	19,000 "	*30,000	*22·01
Pennsylvania.. ..	585 "	62 "	42 "	23,400 "	5,500	14·5
Kaiser Wilhelm.	649 "	66 "	43 "	20,000 "	28,420	21·39
Kaiser Friedrich	599 "	64 "	41 "	17,500 "	?	?
Oceanic....	704 "	68 "	50 "	25,000 "	?	?

* Trial horse power, 33,000; trial speed, 23¼ knots.

The Kaiser Friedrich, which will make its maiden trip in the spring of next year, is generally spoken of as a sister ship to the Kaiser Wilhelm, though its dimensions are considerably less. It is said by the company that it will be a faster ship by from three-quarters to one knot than the larger vessel—a prediction which the



THE BRONZE PROPELLERS OF THE KAISER WILHELM.

Diameter 22 feet 3¾ inches. Weight 26 tons each.

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great reputation of its builder, Schichau, of Elbing, as a builder of fast ships makes very probable.

In its general appearance and internal construction and arrangements, the Kaiser Wilhelm resembles the Lucania more than any other ship. Her greater length is emphasized by the four great funnels, and the greater sheer which she possesses adds greatly to her appearance. A novel feature is the addition of bilge keels to prevent rolling, and these, with the high freeboard forward, render her a remarkably steady and dry boat in rough weather, as was shown in the stormy weather of one or two days of the passage.

The hull is constructed on the well known cellular principle. There are 16 transverse bulkheads extending to the upper deck and one longitudinal bulkhead in the engine room. The boilers are placed in four separate watertight compartments. Twenty-four large lifeboats are carried on the awning deck. The ship has been built in accordance with the requirements of the Imperial German Navy Department, and in time of war she can enter the service as a cruiser.

We present an illustration showing the propellers and the construction of the stern, which is quite a departure from the type common to most ships of this class. It will be seen that the plating just below the water line and above the rudder is swelled out into a cigar-shaped form. This is done to accommodate the connections of the hydraulic steering gear, the arms of which work within the space thus provided. The steering gear was constructed by Brown Brothers, of Edinburgh. The tail shafts are entirely inclosed by bringing the plating of the ship out and around them.

The engines are built on the Schlick system, and run in remarkably even balance, the vibration common to most large ships being noticeably absent. There are four cylinders to each twin engine, as follows: One 52 inch high pressure, one 89¾ inch intermediate, and two 96½ low pressure. The three-bladed bronze propellers are 22 feet 3¾ inches diameter and 32 feet 10 inches pitch and weigh 26 tons each. The crank and the screw shafts are of nickel steel, the shafting being 198 feet long. The two condensers have 35,522 square feet of cooling surface, and the 11,060 tubes, if placed end to end, would measure 25 miles in length. There are 68 auxiliary engines, comprising 124 steam cylinders. For ridding the ship of water there are pumps available whose combined capacity is 3,600 tons per hour.

The steerage passengers are placed forward, the second class aft and the first class amidships. A novelty which will be appreciated is the placing of the first cabin staterooms on the upper and promenade decks, above the level of the bulkheads. This gives free access from one part of the vessel to the other, without having to climb stairways. Moreover, the rooms being high above the water, the portholes can be kept open in comparatively rough weather. The large dining room, capable of seating 350 guests, is on the main deck, between the two sets of smokestacks. On either side are three alcoves and overhead is a large skylight. This magnificent room is 66 feet wide and extends entirely across the ship. The open well in the center is really an alcoved gallery upon the deck overhead, from which a view may be obtained of the room below. The decorations are in white and gold, in the early Italian Renaissance style. At the four corners of the dining room are four smaller dining rooms for the use of parties of 20 or 30. They are named after the mother, the wife, the great statesman and the famous soldier of King William "the Great," as his grandson has ambitiously named him. They are respectively named the Queen Luise, Empress Augusta, the Bismarck and Moltke rooms, and each is decorated with mural paintings illustrating scenes in the lives of these persons. The drawing room above the gallery or vestibule just mentioned is noted for its full length oil painting of William I, by Prof. Koner. The emperor is shown in the imperial ermine with the sword, crown, and scepter. Notable features are the smoking room, with its decorations in light colored oak, and its cozy alcoves and easy chairs upholstered in raised light brown leather. Perhaps the most exquisite room is the library, which is situated forward of the drawing room. It is decorated in rococo, with Gobelin tapestry and unpolished walnut.

There are in all 200 staterooms, accommodating 350 first class passengers. Many of these are arranged for family use, and include sitting room, bedroom and bathroom. The second class staterooms, 100 in number, can berth about 370 persons. Most of these rooms are on the upper deck. The second class dining room extends the full width of the ship and is fully equal to the first class dining room on some of the other ships.

To adequately describe the many features of interest in this vast ship would take more space than is at our disposal. Perhaps as impressive a fact as any is the large number of people which is necessary to run the Kaiser Wilhelm. Including the waiters, stokers, engineers, sailors and officers, the total is 450. If these be added to the 800 steerage, 370 second class and 350 first class passengers, we have a total of 1,970 souls who are housed, fed and safely carried at railway speed over the boisterous Atlantic.

Development of Fruit Flavors.

Some very interesting and suggestive results have been obtained by Jacquemin, who finds that, by the addition of the leaves of fruit trees which in themselves have no marked flavor, to saccharine solutions undergoing alcoholic fermentation, a very marked bouquet of the fruit is developed. Thus, by immersing pear or apple tree leaves in a 10 or 15 per cent solution of sugar, and adding a pure yeast, which by itself gave rise to no marked flavor, after fermentation a liquid was obtained which had a strong odor of pear or apple respectively and an excellent flavor, and on distillation gave an alcoholic distillate in which this aroma was still more marked. Vine leaves act in a similar manner, and the author suggests that it may be possible to improve the bouquet of a poor vintage by the addition of some leaves during fermentation. It is noteworthy that the results are far more marked when the leaves employed are from trees in which the fruit is approaching maturity. The author infers that the flavors of fruits are due to a body elaborated in the leaves, possibly of a glucosidal nature, which is not transferred to the fruits until the latter approach maturity, and is then acted upon by the special ferments contained in the fruit juices and develops distinctive flavors. The matter would appear to be of considerable practical importance.—Comptes Rendus, cxxv, 114.

A PRACTICAL ELECTRIC DARK ROOM LAMP.

Photographers who are traveling around the country often have great difficulty in doing their work well from the trouble experienced in getting a good dark room lamp. The smoke and smell, and danger from fire, in using an ordinary lamp in an extemporized dark room, where the facilities for working are often of the crudest form, are among the principal obstacles to doing good work. To obviate this trouble the Lecoll Storage Battery Company, of 76 Jackson Boulevard, Chicago, have brought out the efficient storage battery

A PORTABLE DARK ROOM LAMP.

lamp shown in the accompanying illustration. This portable lamp will give the operator from eight to ten hours' continuous light with one charging, and the charging is readily effected by connecting the lamp with any direct current electrical system. It will be seen that the lamp proper is in a case in the front of which is a ruby glass. Thus the best possible light is rendered available, there being no chemicals to handle, and nothing whatever objectionable to the user. It is to be remembered that only a direct current system, and not the alternating current, is to be used in charging, as the latter would ruin the battery. The same company also make a combination bicycle and dark room lamp. This suggests itself as a most admirable device for amateurs.

Printing in Clouds.

The amateur when he first launches into photography and has reached that stage in which he feels confident in being able to produce a good printable negative, finds that there are many things to learn before he is able to produce a class of work that will pass off as a carefully finished picture. A landscape without clouds is, after all, but half the picture, and the lazy method of sunning down—for lazy it is—is no more or less than a good excuse for the want of a little trouble to print a cloud carefully into the picture.

The present time of the year is a good one to procure a few cloud negatives, and if one or two are taken now and again when out picture hunting, a valuable stock will very soon accumulate. If taken on films, you can call it at once two negatives, from the fact of their being reversible.

Some workers advocate one method of procedure and some another; but all of them attain the same effect in the end, and it would be exceedingly difficult to cry aloud any one particular method as being better than another, but one that is easy of manipulation demands some attention.

The picture being printed, and the cloud negative having been chosen for the subject, the masking of the picture while printing in the cloud is the one main point that has to be overcome. The joining up of the horizon lines is very often badly done, and if by chance the picture line is slightly intricate, it is here that generally a weak point exists.

Provide yourself with a dozen or so sheets of good white thin tracing paper, cut to the size of the plate you are working, and when you have finished printing your landscape take it out of your frame, place it upon a small board, and place a piece of tracing paper over it, and retire to the other side of the room. You will then be able to draw with a fine pen over the most important objects in the picture a line from one side to the other, following, of course, the details. It is a matter of time that should be given to this part of the work, for without it you cannot succeed. When you have finished this outline, all that is necessary is to fill in the view half with Indian ink—artist's black or vermilion will do, if it does not irritate the eyes—the whole of the lower half of the paper, and let it get thoroughly dry, which will be but a few moments.

The cloud negative is now inserted in the printing frame, and the print, with the mask in register, is also placed in position in the frame, and the cloud printed in to the proper depth.

If you possess a retouching desk, these marks may be made at night from the negative. With a few pieces of stamp paper attach the edges from front of paper to glass side of the negative to prevent its slipping; afterward it can be detached and then blackened out.

The hard lines are softened to a nicety by printing through the tracing paper, and perhaps a little longer time is required to print.

In the event of a negative that has fortunately got clouds developed up, it very often happens, unless the picture is thin, that to print the clouds out properly the view has to be much overdone before the clouds have received enough to define them properly, unless masked in some way. The tracing paper mask comes in handy here. In printing upon paper that gives no visible image, such as carbon, platinotype, bromide, etc., it must be noted that the paper negative and mask should be placed well into one corner of the frame, and a note made of it on the back of the print, so as to provide against any chance of mistakes; for nothing is more annoying than to find, after all your pains, that you have manipulated your sky upside down upon the view when you come to develop the picture. It should be noted that a good white tracing paper gives no grain that will harm a print for the purpose that it is used, and care should be taken that it is not crumpled. It deteriorates with age, going yellow, which makes a long printing job, but the paper is cheap enough for one to make a fresh mask when required.—"Erudio," in Photographic News.

Scientific Expedition to Christmas Island.

When the world is fast becoming all mapped and labeled and described, and geologized and botanized, it is refreshing to learn that there are still a few miles of little known ground. Christmas Island, about 200 miles south of the western end of Java, the nearest land, from which it is separated by an ocean about four miles deep, is one of the few isolated spots on the earth that has remained practically uninhabited by man. It has now a small population numbering 22 persons, consisting of Mr. Andrew Ross, who is the only European, his family, and about a dozen laborers from Keeling-Cocos Islands, says the London Times. Mr. Ross, however, has only once penetrated to the further side of the island, the journey taking three days (the island is about twelve miles long and seven miles broad). Now, however, the island is to be used by the Christmas Island Phosphate Company, and a working party is now on its way there. Hence it is of peculiar importance that a scientific exploration should be undertaken to obtain an accurate account of the native fauna and flora before they are displaced by introduced forms of life.

Dr. John Murray, of Edinburgh, has offered to the trustees of the British Museum to defray the expenses of sending out a naturalist to collect everything indigenous to the island, and to present the specimens to the Museum, if the trustees will allow one of their officers to go out. The trustees have accordingly dispatched Mr. C. W. Andrews, of the department of geology in the Natural History Museum, to make an exhaustive survey and exploration of the island. The area is about 100 square miles, the highest point being about 1,200 feet, so that a considerable variety of temperature and other conditions occur. The fauna as far as known is remarkable for the very large proportions of species peculiar to the island. Thus three of the five known mammals, all the land birds, and four out of five land reptiles are endemic. Of insects, out of some thirty-five species that have been determined, twenty-three were new. In one respect the island is fortunate—there are no wild animals, snakes, or other creatures inimical to man. Most of the island is covered by thick forest growth, in which orchids and other epiphytes are very common, while it is probable that not one-third of the flora is yet known.

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Plants That Give Light by Night.

The following account of the phosphorescence of plants, which is much more common than most persons imagine, though few have observed it, is contributed to La Nature by M. Chas. Marsillon. "The phosphorescent gleam that certain plants and flowers give out in darkness constitutes one of the strangest phenomena of the vegetable kingdom. The illustrious Linnæus was the first to call the attention of the scientific world to this singular phenomenon, which before his time had been unobserved or unknown. While walking in his father's garden on a calm, warm, and fine summer night, he was surprised to see a bunch of Tropæolum majus, the common nasturtium, or capucine, that seemed to have flowers that shone with iridescent colors in the midst of the gloom.

"Captivated by the novelty of the spectacle, the future scientist repeated his nocturnal walk many times, and each time he saw the fantastic gleams of the capucine flowers. An electrician of the period, Wilcke, to whom the young Linnæus related his interesting observations, attributed the display to some electric phenomenon, an opinion that was shared by a number of writers who mentioned the curious property.

"Nevertheless, all did not agree on this point. Some were of the opinion that this phosphorescence was merely apparent, and was an optical illusion. . . .

"Numerous other flowers possess the strange property observed in the nasturtium. Among them, the marsh lily, that grows abundantly in the marshes of South Africa, presents the same peculiarities. Erasmus Darwin, who studied this flower closely, regarded it as the most perfect type of phosphorescent vegetables. The assertions of a great number of scientific observers leave no doubt of the fact that certain plants have this singular property of becoming luminous at night.

"A Swedish naturalist, Haggren, carried his love for this new kind of investigation so far as to employ a special watchman to walk about his garden for whole nights and notify him at once of luminous plants and flowers. The scientist was thus able to prove that the phosphorescence was noticed especially after a very sunny day, while it was invisible in rainy weather. The light increased in intensity during July and August. It appeared about half an hour after sunset and vanished at dawn.

"Haggren carried his investigations farther still. He subjected these singular flowers to a microscopic examination to find out whether the phenomenon did not depend on the presence of insects or other organisms. Repeated experiment showed the improbability of this; he found nothing, and concluded that, according to the opinion of Wilcke, the phenomenon had probably an electric origin. He thought, besides, that the pollen of the flower probably played an important part in the production of the light. His opinion seemed to be confirmed by the fact that the flower of the nasturtium, on which he experimented, shone with a brighter light at the time of full florescence.

"Dowden and three other botanists observed the same phenomenon at different times. They reported their observations in the London Botanical Journal about 1842. More recently, during the past ten years, Canon Russel has reported the same phenomena. His scientific papers prove that the phosphorescence extends to the leaves of certain plants, those of the nasturtium in particular. This scientist thus proved that the light persists even after the leaves have been detached from the parent stem.

"In September, 1891, he wrote to Science Gossip as follows: 'During the evening of June 19, 1889, I was walking in my garden, when, in passing near a marigold, the Calendula officinalis, I was struck with the intense light given out by its flowers. I waited several seconds and observed to my great surprise that the scintillating light seemed to play around the petals. I thought that I was the victim of an ocular illusion; so, to check my own observations, I called several persons and asked them if they saw anything extraordinary.

"'Several exclaimed that they saw little flames dancing around the flowers; others could scarcely distinguish them, and only at rare intervals; others still, in spite of sustained attention, could see nothing remarkable. This is, without doubt, due to the fact that the power of vision varies greatly with observers, the optic nerves being more sensitive with some than with others. The phenomenon, which began to be visible about half-past eight in the evening, lasted a whole hour, with remarkable alternations of great and of decreasing intensity. At certain moments the entire plant became phosphorescent.'

"The fraxinella, or Dictamnus fraxinella, of which there are three varieties in our gardens, the white, the red, and the purple, seems to excel all other phosphorescent flowers or plants in luminous intensity. This plant secretes in abundance an essential oil that in times of great heat spreads in a thin layer over the surface of the flower and then volatilizes, impregnating the surrounding atmosphere with its vapor. This vapor has the property of becoming luminous in darkness, so that the flowers appear to take fire by contact with the surrounding atmosphere.

'A variety of euphorbia, the Euphorbia phosphorea, has also, in a very marked degree, the power of becoming phosphorescent during the night, in the heart of the vast Brazilian forests. In this same country, a sort of grass, which the natives call khuskhus, shines, at certain hours of the night, with a bright light. If we are to believe the tales of trustworthy travelers, in some cases horses and other animals browsing on this grass have stopped in surprise to see it suddenly give out light and surround them with flames that envelop their trembling limbs in all directions. . . .

"But if flowers have this strange property in a remarkable degree, other plants among the lichens, mosses and fungi shine with an equally bright light in the same conditions. In the environs of Dresden, especially, there are several coal mines where grows a small species of agaric along the shafts and galleries. It presents to the visitor the appearance of innumerable luminous festoons of changing colors. . . .

"The eminent naturalist Joseph Hooker thinks that the source of this phosphorescence is a slow combustion, without heat, that takes place in the mycelium of the fungi during a continual oxidation of its substance. In northern India, among the agarics that flourish there, there is a cryptogam similar to that of the Dresden mines and equally luminous.

"The Agaricus olearius, a common mushroom of the south of France, grows, as its name indicates, on the bark of the olive, even in its smallest crevices. It makes its appearance as a parasite of this tree, in the month of November, and transforms the trunk of the olive tree into a phosphorescent mass, producing one of the most original effects that can be met with. . .

"Quite as remarkable as the preceding is the Agaricus Gardneri, the parasite of a Brazilian palm. Its light, a brilliant yellowish white, may be compared, for intensity and beauty, to that given by the tropical fireflies. Another cryptogam, a native of Borneo, growing like the preceding on various kinds of trees, gives out a light with greenish tints like that of the electric spark. When the natives see this singular light shining in the black night, they flee in terror, believing that they have seen the Evil One. . . .

"We will close by noting the interesting experiments made by Dr. Tulasne on vegetable phosphorescence. He has proved that the light emitted by mushrooms disappears completely in a vacuum or when they are plunged into a vessel that contains only irrespirable gases. He infers from this that, as Hooker asserted, there is a combination between the oxygen of the surrounding atmosphere and a substance peculiar to this plant. Such is the most probable explanation, and the one generally held by scientists, of the singular phenomenon presented by phosphorescent plants."—Translated for the Literary Digest.

Electric Railways of Europe.

L'Industrie Electrique has just published a complete list with details of the electric railways now operating on the continent of Europe and in Great Britain. The summary, which we print herewith, shows that Germany is far ahead of any other European country in both the number of electric railways and in the length of mileage, etc. It is interesting to note also that Germany has four roads using storage batteries and France five such roads. Switzerland also makes a very good comparative showing. Considering the number and density of the population of Europe, that continent ought to be a veritable paradise for manufacturers of electric railway apparatus:

	Total Length of Lines in Kms.	Total Power on K. W.	Number of Motor Cars.	Lines with Aer. Cond.	Lines with Undergr. Cond.	Lines with Centr. Rail.	Lines with Accum.	Total No. of Lines.
Germany	642·69	18,963	1,631	45	2	..	4	51
England	109·42	4,670	168	10	1	6	1	18
Austria-Hungary	83·89	2,589	194	7	2	..	1	10
Belgium	34·90	1,220	73	4	1	..	..	5
Bosnia	5·60	75	6	1	..	..	..	1
Spain	47·00	600	40	3	..	..	..	3
France	279·36	8.756	432	19	1	1	5	26
Holland	3·20	320	14	..	..	..	1	1
Ireland	18·00	486	32	1	..	1	..	2
Italy	115·67	5.970	289	9	..	..	.	9
Sweden-Norway	7·50	225	15	1	..	..	..	1
Portugal	2·80	1,0	3	1	..	..	..	1
Roumania	5·50	140	15	1	..	..	..	1
Russia	14·75	870	48	2	1	..	..	3
Servia	10·00	200	11	1	..	..	..	1
Switzerland	78·75	2,622	129	17	..	..	..	17
Totals,	1,459·03	47,596	3,100	122	8	8	12	159

DUPUOY demonstrates the oxidizing power of animal charcoal by the addition of a few grains of that substance to a few c. c. of fresh tincture of guaiacum. An immediate intense blue coloration is produced in the cold. Wood charcoal does not give this reaction. It is thought that probably to this oxidizing power is due the beneficial effect of animal charcoal on ulcerations and granular wounds.—Bull. de la Soc. de Pharm. de Bordeaux, xxxvii, 171.

Science Notes.

Experiments with the synchronograph, recently conducted in England by the inventors of the system, Messrs. Squires and Crehore, are reported as very successful. In a test made August 22 over a line from London to Aberdeen and return by underground cables messages were sent at the rate of 4,300 words per minute. In another test a submarine cable 120 knots long was employed. Messages were transmitted in this case at the rate of 1,300 words per minute.

A curious landslip occurred a few days ago in the village of Sattel, in Canton Schwyz. An inn situated by the side of a road which runs across the slope of a hill was carried, without sustaining any injury, thirty-five feet down the hillside, stopping just short of being precipitated into the river Steinen. The road in front of the house, the garden, and all the immediate surroundings of the inn are intact. By the house were two large elms, and even these have in no way suffered.

On August 8 last, at Frankfort-on-Main, a statue of the Frankfort physician, Samuel Thomas von Soemmering, was unveiled. Dr. Von Soemmering's name is well known in connection with the early history of telegraphy, says The Electrical Engineer. The statue, which has been executed by Petry, is a life-sized figure of Soemmering, and next to him is represented an electric battery connected to his electro-chemical receiver. The granite pedestal of the statue bears the words: "S. Th. v. Soemmering, Erfinder d. elektr. Telegraphen."

The risks that the modern student of bacteriology runs in the pursuit of his investigations are exemplified by the fact that Surgeon-Major Ronald Ross, of the English army, who has been employing three months' leave in investigating the malarial mosquito theory (recently set forth in these columns), has contracted the infection upon which he was endeavoring to throw light. Says The British Medical Journal: "Deeming himself feverproof, he had gone to a highly malarious district . . . in order to have abundant material for work. We are glad to hear of his recovery, and also to learn that, notwithstanding his recent illness, he has made some important and hopeful observations in connection with the theory for which he has done so much. We trust that the devotion which he has shown in the cause of medical science and humanity will have a better reward than a dose of jungle fever, and that every facility will be granted to enable him to bring his disinterested and arduous labors to a satisfactory conclusion, and with as little danger to his health and life as possible."

A most phenomenal island is that of Bornhohn, in the Baltic, belonging to the kingdom of Denmark. It is famous for its geological peculiarities, consisting as it does almost entirely of magnetite, and its magnetic influence is not only very well known to the navigators of those waters, but also much feared by them, on account of its influence on the magnetic needles, which makes the steering of a ship correctly a matter of much difficulty. In fact, this influence is felt even at a distance of miles, and so palpably that, on the island being sighted by mariners on the Baltic, they at once discontinue steering their course by the needle, and turn, instead, to the well-known lighthouses and other holds to direct their craft. Between Bornhohn and the mainland there is also a bank of rock under water, which is very dangerous to navigation, and because of its being constantly submerged, vessels have been frequently wrecked at that point. The peculiar fact in this case is that the magnetic influence of this ore bank is so powerful that a magnetic needle suspended freely in a boat over the bank will point down, and, if not disturbed, will remain in a perfectly perpendicular line.

More than seven thousand members attended the twelfth International Medical Congress held at Moscow on August 19–26. From a report in the Lancet, we learn, says Nature, that the Grand Duke Sergé Alexandrovitch officially opened the congress on August 19, in the presence of a brilliant assembly; Count Delianof then delivered a short address of welcome in the Latin tongue. Prof. Skilfosovski, president of the organizing committee, also delivered an address. Prof. Roth, the general secretary, then gave an account of the preliminary labors of the organizing and executive committees. The recent congress was larger than any of its predecessors, the number of members exceeding 7,300, more than half of whom came from abroad. Prince Galitzin, the mayor of Moscow, welcomed the members of the congress in the name of the city of Moscow, and added that, to commemorate the event, the municipality had decided to offer a triennial prize for the best work on some selected medical subject. After brief addresses by the delegates of the different countries represented at the congress, Prof. Virchow gave an address upon "The Continuity of Life as the Basis of Biological Science." The second address was by Prof. Lannelongue, who had for his subject "The Surgical Treatment of Tuberculosis." Dr. Lauder Brunton then read an address on "The Relations between Physiology, Pharmacology, Pathology and Practical Medicine."

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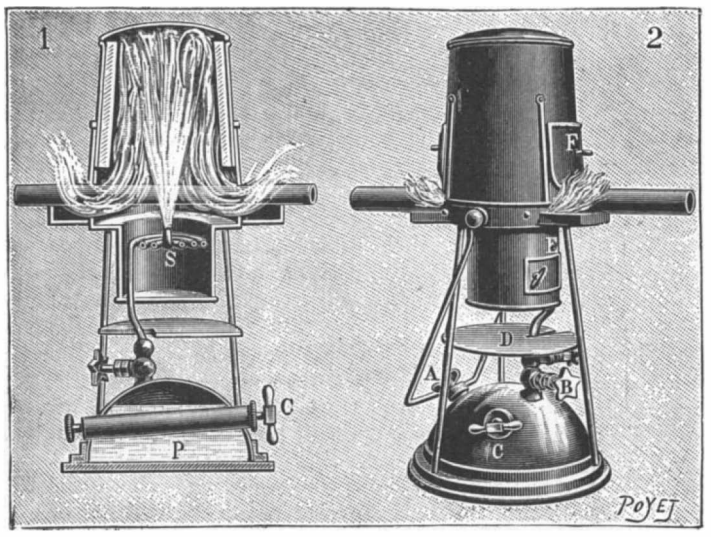
PORTABLE PETROLEUM STOVE.

Plumbers, gasfitters and roofers have constant need of a portable stove for the various operations that they have to perform, such as bending iron pipes, melting metals, brazing, tempering tools, heating soldering irons, etc.

Coke or charcoal stoves sufficiently powerful present various inconveniences. It takes time to get them ready for use, and an unnecessary amount of fuel has to be consumed to keep them going.

The portable stove that we represent in the accompanying engraving is both powerful and economical. It is always ready for operation, necessitates no expense when not in actual use, and is widely employed in places where petroleum is cheap.

The apparatus consists of a copper reservoir, P, containing the petroleum, and traversed by a pump, C, which serves to establish a pressure of air at the surface of the liquid. Above the reservoir and separated therefrom by a horizontal disk, D, forming a screen to prevent the heating of the reservoir, is placed the stove properly so called. It is in the latter that all the petroleum is burned after being vaporized by its passage through a worm, S, heated by the flame. This worm is formed of an iron tube starting from the bottom of the reservoir and ending in a central jet at the other extremity. Upon the ascending tube is placed a cock, B, for regulating the discharge of the petroleum, and, consequently, the intensity of the flame. Beneath the worm there is an iron cup which is opened at E, and into which, for lighting, is poured a spoonful of amylic alcohol, after care has been taken to fill the reservoir, P, with petroleum after unscrewing the plug, A. The alcohol is lighted, and as soon as the worm is hot the cock is opened, the jet takes fire and the apparatus is ready for use. Upon the stove there may be placed either a cast iron pot in which to melt lead or tin, or the tools that it is desired to heat or temper, or the iron tubes to be bent, etc. The apparatus renders the same services as a small portable forge. —La Nature.



1. Section. 2. General View.

PORTABLE PETROLEUM STOVE.

USE OF THE SAND BLAST FOR CLEANING STRUCTURAL IRONWORK.

The massive steel viaduct which carries One Hundred and Fifty-fifth Street across the terminal station of the Manhattan Elevated Railway has suffered very serious corrosion, as the result of the gases which are continually playing upon it from the locomotives of the road. In addition to the coat of paint given to the ironwork at the shops, it has been painted four times, or once a year since its erection; yet so active has this agent been in scaling off the paint and assisting in the corrosion of the metal, that the Board of Public Works has been obliged to take special measures to protect the structure. It has been decided to first thoroughly clean the steelwork by the sand blast and then paint it with eighteen different varieties of paint. As time goes on, a careful record will be made of the behavior of each variety of paint, and in this way it is hoped to secure a coating that will protect the surface for a reasonable length of time.

It was found that the common wire brush would not give that perfectly clean surface which was necessary for the best results. It was necessary to get rid, not merely of the old paint, but also of rust and scale, and the consulting engineer of the board decided this result could only be secured by the use of the sand blast. The work is being done by Ward & Nash, of Boston, Mass., under the supervision of Mr. M. E. Evans, of the Board of Public Works.

The air is compressed by two Ingersoll-Sergeant machines, which deliver to a receiver which has a capacity of 30 cubic feet. From this it is led to a second receiver, which, together with the mixers, is placed on the staging which has been built beneath the trusses. The mixer is a vertical iron cylinder 30 inches in diameter and about 5 feet high. In the upper half are located two hoppers which are riveted in place one above the other, as shown in the engraving. Each hopper is furnished with a closing valve and a valve stem, the stem of the lower valve passing through the upper stem, which is hollow. Below these is a third hopper of less diameter than the cylinder. It delivers into a three-inch pipe in which is a sliding plate provided with a narrow slit which, by means of a rod and a lever outside the mixer, can be enlarged or reduced to vary the stream of sand which is to be blown into the hose pipe.

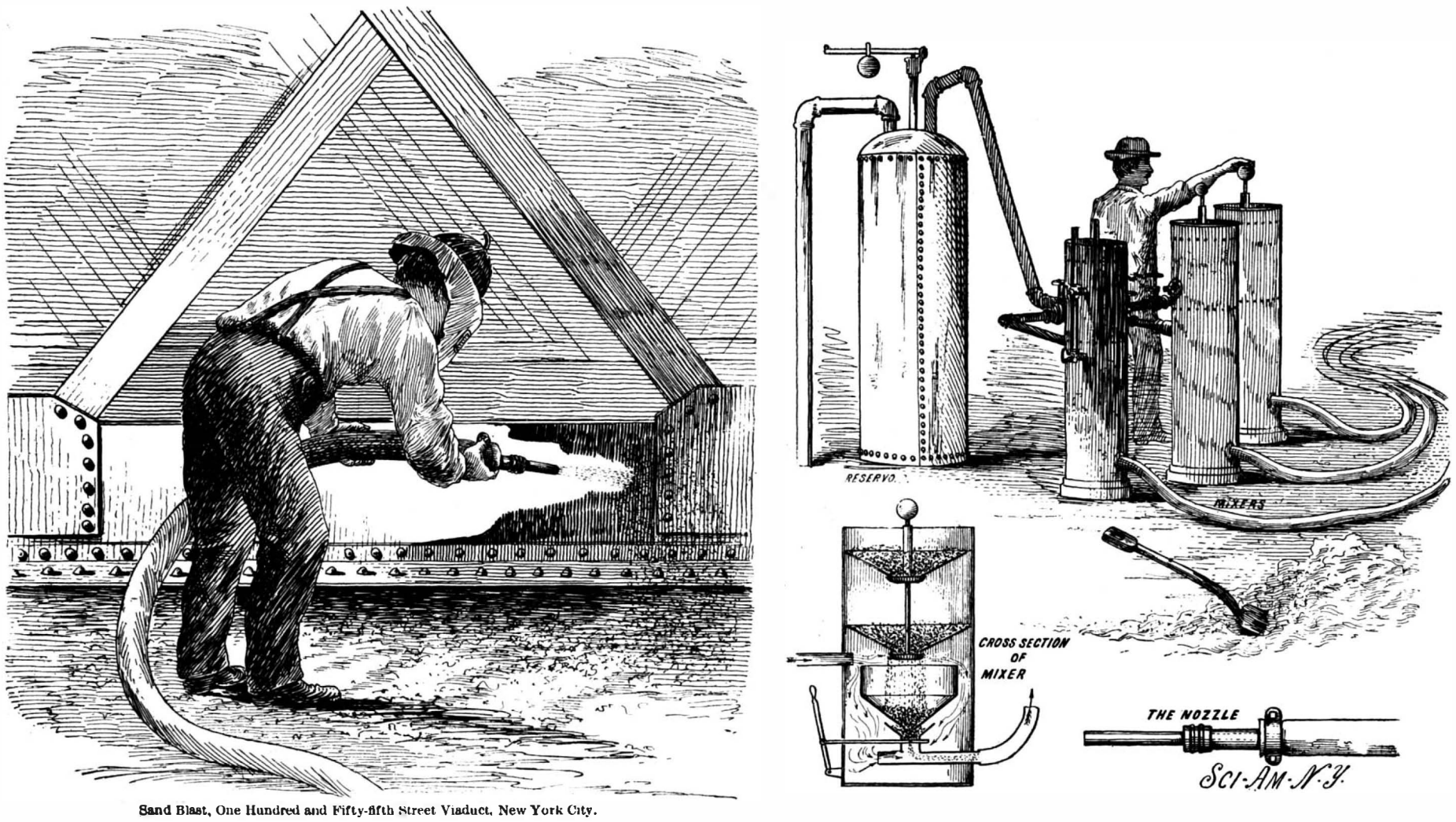
The two upper hoppers being airtight, it will be seen that the mixer is divided into two airtight spaces. The compressed air is admitted to the lower space by the pipe shown in the engraving and leaves by the pipe seen on the opposite side of the mixer. The mixing is done as follows: The sand (in this case a clean and rather coarse silicious sand, obtained on Long Island Sound) is fed into the top hopper. The lower valve is closed and the upper one opened and the sand passes into the second hopper. The upper valve is now closed and the heavy ball which is attached at the top of the stem of the lower valve is then given a slight blow which serves to force the lower valve open against the air pressure and allows the sand to fall to the third hopper. The action of the above device, it will be seen, is similar to that of the common air lock.

By reference to the engraving it will be seen that the air (which enters the mixer carrying 20 pounds pressure to the square inch) can circulate freely round the lowest hopper and that it finally escapes through the outlet pipe into which the sand is falling in a thin sheet. Here it picks up the sand, carrying it through the hose pipe to the nozzle. The mixing is very complete and remarkably even. The 2½ inch hose is of a special make, being lined with rubber to resist the cutting action of the sand. The nozzle is 8 inches in length with a $\frac{9}{16}$ inch opening, and is made of chilled iron, with a view to resisting the abrasion of the sand, which is so severe as to necessitate frequent renewals of this part. The air would leave the nozzle at a speed of over 1,100 feet a second if it were unencumbered with the sand. The speed of the mixture of sand and air is about 300 feet per second.

The man who handles the nozzle is protected by a helmet with gauze eye pieces. The nozzle is held a few inches from the ironwork, and, as the particles of sand strike the surface, they break up and cut away all the scale, rust and old paint, leaving a perfectly clean metal surface exposed. The blast is so searching that all the interior surface of pitholes is cleaned out. Herein lies one of the great advantages of the blast over the steel wire brush, when intricate structural work is being cleaned, as the sand will reach interior surfaces which the steel brush will not touch. It is estimated that it takes about one-third of a cubic foot of sand to clean each square foot of surface on this structure. At the commencement of the work it cost about 20 cents per square foot to do the cleaning, and at the time we inspected the work the cost was reduced to 10 cents per foot. It is estimated by Mr. Evans that, for large surfaces like this, the plant, erection of scaffolding and the cleaning would cost at the rate of 7½ cents per foot.

The surface of the metal is so perfectly cleaned that it is extremely sensitive to the action of the weather, and in a few hours after cleaning, if the atmosphere is humid, the grayish white color will have changed to dull red, as the result of oxidation. Consequently the cleaning and the painting are carried out in one day, the cleaning going on from 6 A. M. to 3 P. M. and the first painting being done from 3 P. M. to 6 P. M. of the same day. The paints which have already been applied adhere to the metal much more firmly than that which was put on over old paint.

We are indebted to Mr. M. E. Evans, of the Board of Public Works, for particulars of this interesting work.



Sand Blast, One Hundred and Fifty-fifth Street Viaduct, New York City.

USE OF THE SAND BLAST FOR CLEANING STRUCTURAL IRONWORK.

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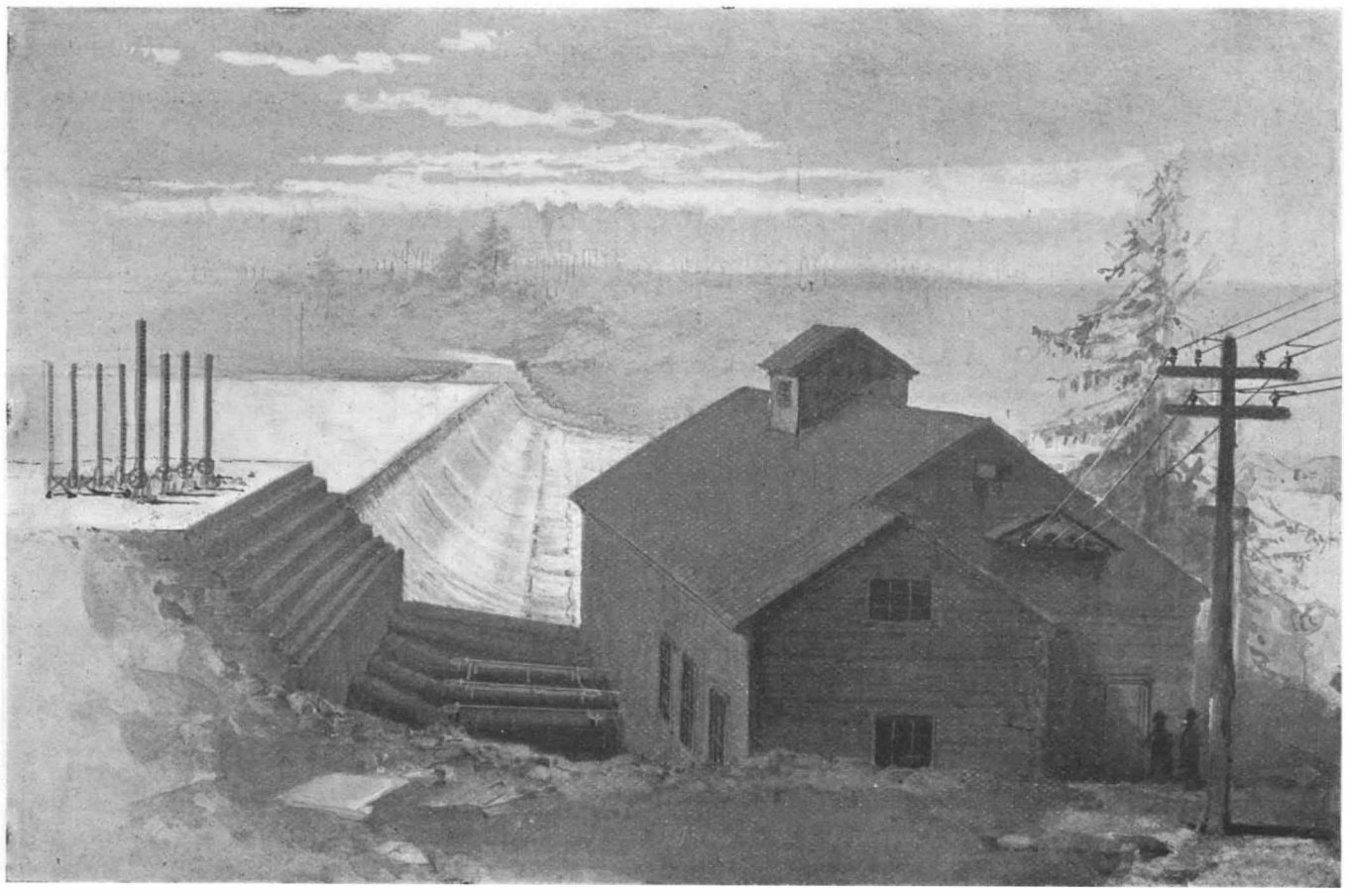
THE HARTFORD ELECTRIC LIGHT AND POWER PLANT.

With the completion of the new plant of the Hartford Electric Light Company and the leasing of the old plant of the Hartford Electric Light and Power Company, the citizens of Hartford are able to boast that they use more electric light and power than any other city in the United States and that they have one of the best electrical systems on the continent.

The original dam on the Farmington River was built in 1889. The site was 10·8 miles distant from Hartford, and at that time the success of long distance power transmission was somewhat problematical. The dam, 18 feet in height, was accordingly built of wood, with a vertical face and wooden abutments. When it was decided to enlarge the electrical system of the city last year, 5 feet were added to the height of the dam, bringing it up to 23 feet, and the wooden abutments were replaced by a solid construction of granite. The water is led through four pairs of 36 inch horizontal turbines by means of large steel flumes 8 feet in diameter, which pass through the abutment and inclose the turbines, as shown in the accompanying engraving. The turbines, which are of the McCormick and Rodney Hunt type, are arranged in pairs upon a common shaft, the water entering at the ends of the casing and discharging centrally through a draught tube. The total capacity is 1,600 horse power. The turbines are controlled by Lombard governors, which compress air into a receiver for use in shutting down the gates, should the load be suddenly taken off during operation. If the turbines should commence to race, the governor automatically releases the compressed air and shuts down the gates in a few seconds' time. Two pairs of turbines are belted to each generator, the generator pulley being double crowned for this purpose. There are two 600 kilowatt 22 pole generators made by the Westinghouse Electric and Manufacturing Company. They are run at 325 revolutions per minute and the frequency of the current is 60 cycles per second.



THE FARMINGTON RIVER DAM AND POWER HOUSE.

The current at 500 volts is raised in transformers to 10,000 volts for transmission to the city, 10·8 miles distant. It is brought in over six No. 0 copper wires whose combined cross section is about one-fourth of a square inch. It was decided to use six wires in place of three in the three-phase transmission (two being connected in multiple on each phase), because by this arrangement the lines used in the former plant could be utilized with better economy. At a distance of a little over half a mile from the Pearl Street station, in Hartford, the wires are carried underground and connected to three No. 0000 cables which run direct to the station. The loss of power in transmission is less than 10 per cent for the 10·8 miles. By reference to the engraving of the power station at Farmington, it will be seen that the power is transmitted from the turbines to the generators by belting, the distance between the respective shafts being 50 feet. As a striking illustration of the relative economy of electric as compared with belt transmission, it may be mentioned that the loss in this 50 feet is 10 per cent, or equal to the loss on the whole 10·8 miles of electrical transmission. The lines are protected from lightning by banks of Wurts arresters and choke coils. The former are mounted in racks, one rack being placed in each phase of the circuit both at Farmington River and the Pearl Street station.

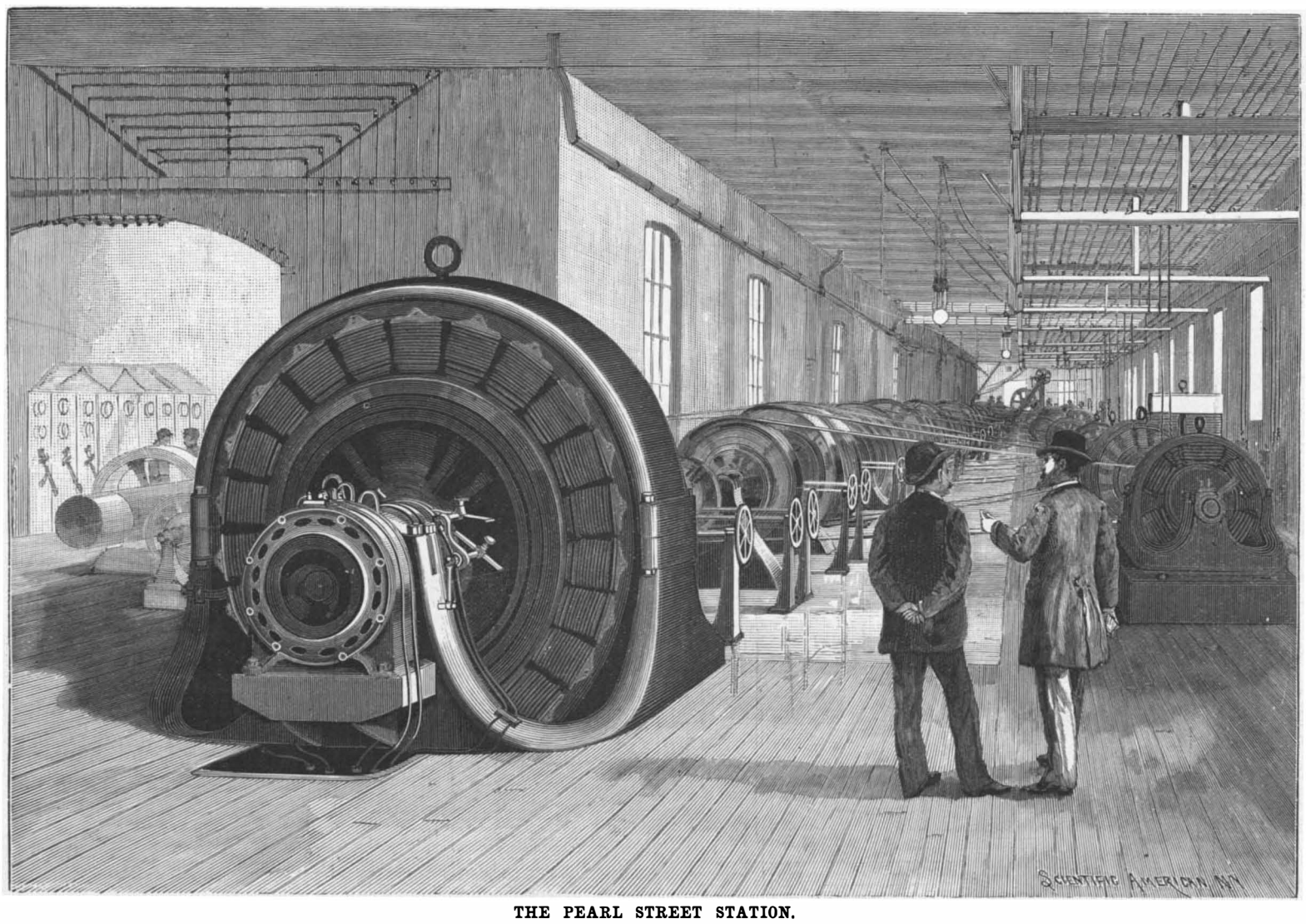
At Pearl Street station the 10,000 volt three-phase current, which was used for the long distance transmission as being best adapted for the work, is reduced to two-phase, 2,400 volt current. Here the electric energy is used in three different ways :

1. It supplies current to the alternating current lighting and power system of the city.

2. It supplies current to the rotary transformers at the State Street station.

3. The current that is not used for the above purposes operates a 600 kilowatt motor at the Pearl Street station.

In the alternating current distribution at Pearl Street mentioned above the lighting circuits are run at 1,200 volts, on the single-phase system, and the light and



THE PEARL STREET STATION.

THE HARTFORD ELECTRIC LIGHT AND POWER PLANT.

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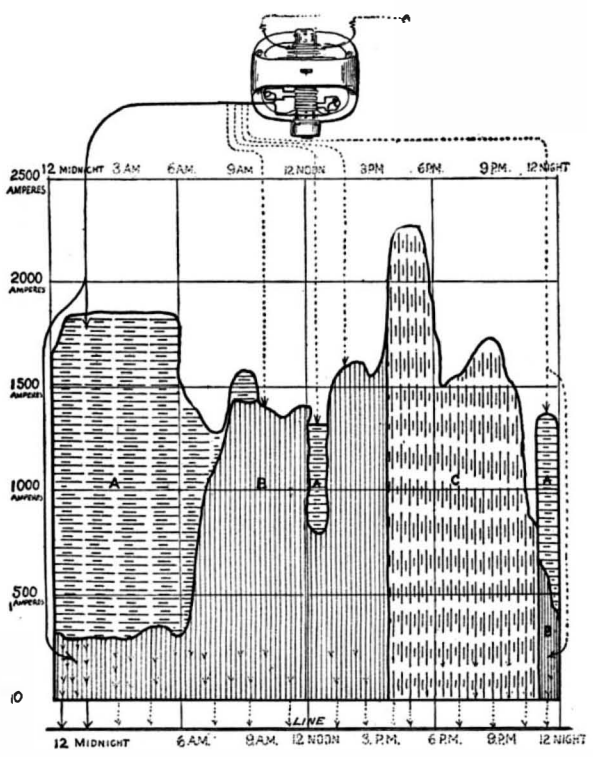
power circuits at 2,400 volts on the two-phase system. Under the present system the current that is not derived from the Farmington power house is furnished by the engines and generators at Pearl Street, which were formerly the property of the Hartford Electric Light and Power Company. This plant consists of a 1,600 horse power Cooper-Corliss compound condensing engine belted to one end of a shaft at the other end of which is a 600 kilowatt Westinghouse generator. This line of shafting serves also to operate the series-arc dynamos and two 200 kilowatt generators that supply current to one of the suburban street railways.



STATE STREET STATION LOAD DIAGRAM.

The 600 kilowatt generator may operate either as a motor or a generator. It is at all times connected with the switchboard, so that when the water power is not equal to the demands of the alternating system (as often occurs during the hours of maximum load) the motor at once becomes a generator driven by the engine and supplies current in multiple with the Farmington power house generators. In the summer time the plant at the river can only be run for 12 hours out of the 24, and during this period the steam power plant acts as an auxiliary. Moreover, in case of a breakdown of the water power, the same plant would be available to furnish the city's needs.

The presence of the 600 kilowatt motor in the station also allows the voltage to be varied on the alternating system without reference to the power station. The voltage may be made to vary through a wide range by varying the field excitation of the motor, and this is done by introducing a lagging current into the transmission line. An induction motor serves to start the 600 kilowatt motor, the former being thrown out of the circuit as soon as the correct speed is obtained. As the motor is built to work at a 2,400 volt pressure, no special transformers are required when it is operated as a generator.

The State Street station, of which we present an interior view, is said to contain the largest storage battery in the United States. At the far end of the room will be noticed the large marble switchboard, which is 8 feet in height, and when completed will measure 50 feet in length. To the left are the two rotary transformers and behind the switchboard are four stepdown static transformers. The 2,400 volt current which is delivered from Pearl Street station is received by the rotaries and their accompanying transformers, which change it from alternating two-phase and deliver it as 240 volt direct current to the three-wire system.

The current received from Pearl Street station is controlled and recorded on the panel to the left. Upon another panel are the switches and meters which receive the current from the rotary transformers. They are provided with automatic circuit breakers, which prevent the pressure from rising above a certain point. The tall metal frames standing up above the switchboard at the center contain vertical screws, by means of which "end cells" in the storage battery can be cut in or out of the circuit, according to the variation of the demand. On each side of this regulator are the discharge panels. To the right again are the switches which control the underground feeder circuits.

The storage battery, manufactured by the Electric Storage Battery Company, of Philadelphia, contains 130 cells, 65 on each side. The cells are made of oak and are lined with lead, and each cell contains 31 negative and 30 positive plates. The negative plates are of the chloride type, the positive plates being the Manchester type of Planté plate. The capacity of the battery is a discharge of 1,700 amperes on each side for five hours. The total weight of the cells is 300 tons, and each cell measures 2 feet by 5 feet by 4 feet high. When the battery was erected it took ten car loads, or 180,000 pounds, of sulphuric acid to charge it. The switchboard connections are arranged so that the battery is at all times connected with the distributing bus bars, whether it is charging or discharging, or when the battery and rotary are supplying current in multiple to the lines. As a result of the connection of the alternating to the direct current system through the rotary transformer, the battery is able to provide for fluctuations in either of the systems.

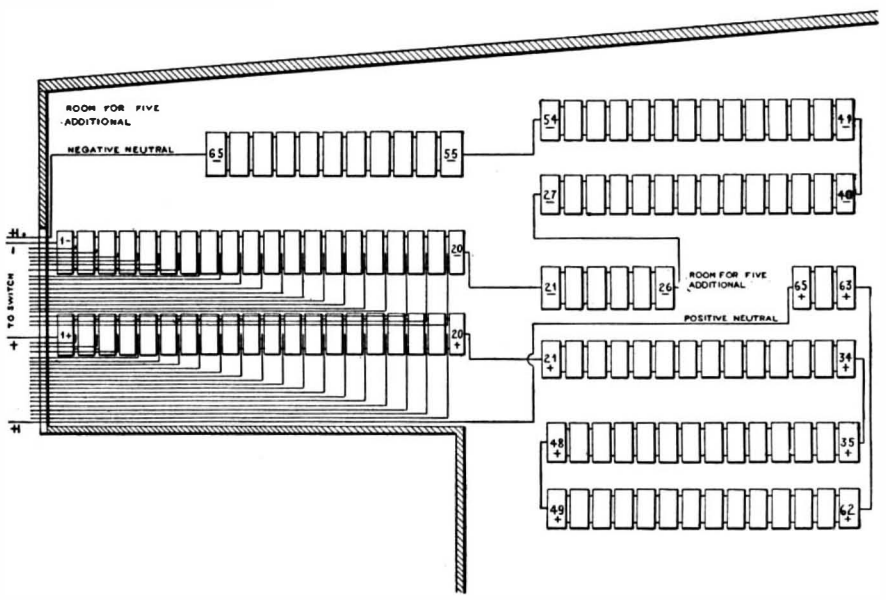


DIAGRAM OF STATE STREET BATTERIES.

The accompanying load diagram will assist the reader in understanding the part played by the storage battery in the Hartford system. The figures on the vertical scale show the amperes and the horizontal scale the time for 24 hours on December 12, 1896. The battery has a capacity of 500 horse power for five hours. It is capable of running 1,000 incandescent lamps for 34 hours or 34,000 lights for one hour. The shaded space marked A shows the current that was discharged into the battery from the wire through the rotary transformer. The space marked B shows the current that was sent direct from the transformers to the lines, and that marked C indicates the current sent into the lines from the battery. It will be seen that from 12 P. M. to 6 A. M. the consumption was about 350 amperes. Between 6 A. M. and 8:30 A. M. it rises rapidly to over 1,500 amperes. At about 8 A. M. the current from the Farmington River station, which has been passing into the battery, temporarily assists the transformer current, as shown by the horizontally shaded portion of the diagram at the top of B, at this hour. The demand then drops slightly until near noon, when it falls suddenly to 750 amperes. This is caused by the large number of lights and motors that are shut off for the dinner hour. The surplus current meanwhile flows into battery. From 1 P. M. to 3:30 P. M. the whole of the Farmington current goes to the lines. From 3:30 P. M. to 11 P. M. the lines draw all of their current from the battery, and at 11 P. M. the charging of the battery again commences, and the current for the lines is drawn from the transformers. By 3:30 P. M. the battery will be fully charged and the 1,000 horse power from Farmington River can be utilized at Pearl Street station. With the battery at State Street fully charged, the Farmington current running the Pearl Street generator and the Pearl Street engine also running, the total horse power available would be about 3,000.

We are indebted to Mr. William Lispenard Robb, the electrical expert of the company, and Mr. R. W. Rollins, superintendent of the works, for courtesies extended during the preparation of this article.

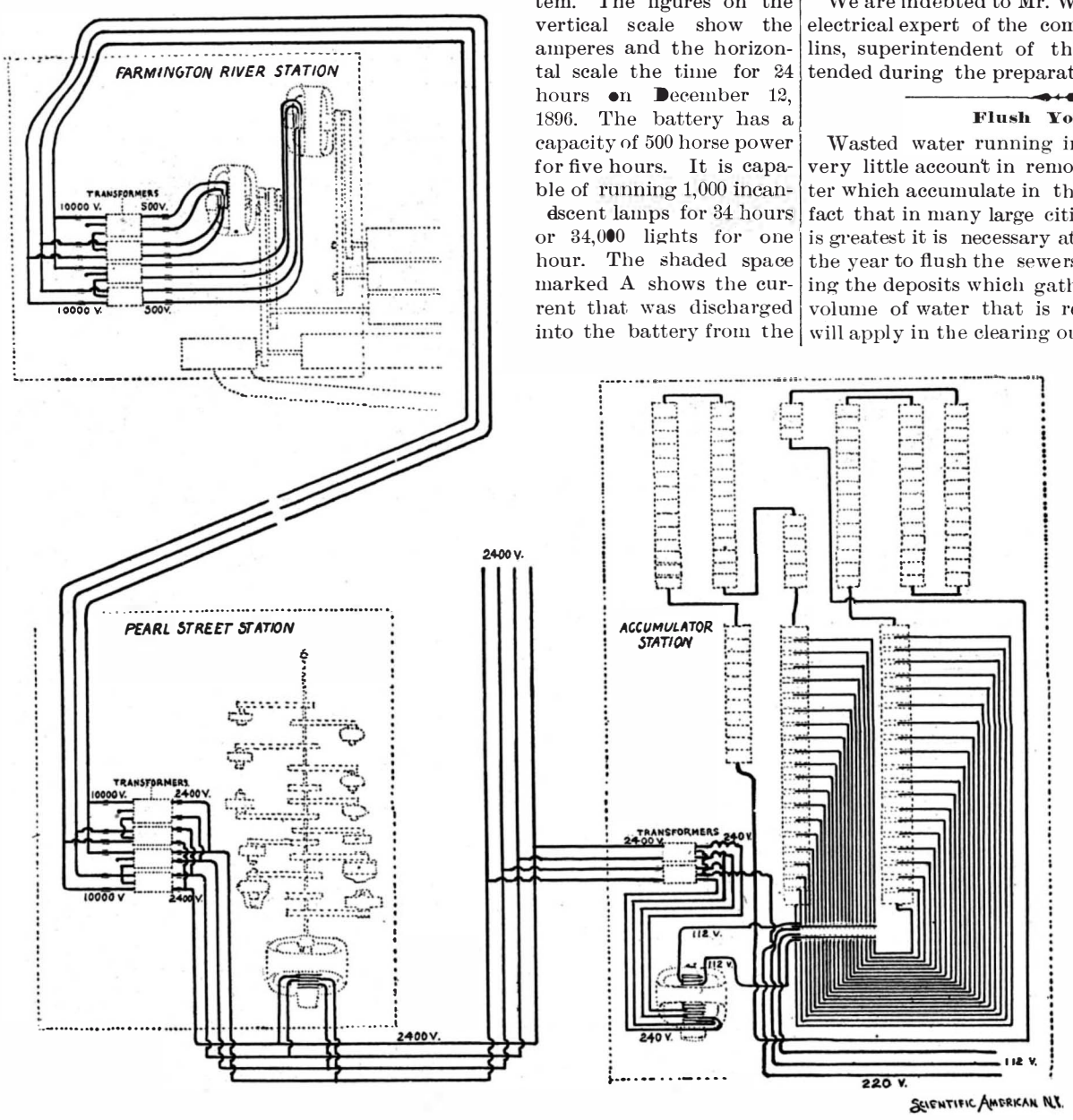


DIAGRAM OF THE HARTFORD ELECTRIC LIGHT AND POWER PLANT.

Flush Your Pipes.

Wasted water running into drains and sewers is of very little account in removing deposits of solid matter which accumulate in them. This is proved by the fact that in many large cities where the consumption is greatest it is necessary at frequent intervals during the year to flush the sewers for the purpose of removing the deposits which gather there. It is weight and volume of water that is required, and the same rule will apply in the clearing out of a drain or waste pipe. In the ordinary closet a stream of water pours through the valve into the arm of the bowl, then encircles the bowl, feebly drops into the trunk of the closet, then into the trap and down the soil pipe. The internal circumference of the soil pipe is a little over twelve inches. The stream of water flattened out will not exceed four inches; consequently, but one-third the inside circumference of the soil pipe is ever washed by the water. A pail of water, thrown into the bowl of a water closet, an operation taking only a few seconds of time and a few gallons of water, will have a flushing effect more complete than if the closet valve were kept open for a whole day.—Water and Gas Review.

MR. R. T. GUNTHER has gone to Lake Urumiya, on the Persian frontier, with a view of studying the fauna of the lake.

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THE WILLIAM I MONUMENT AT THE PORTA WESTPHALICA.

Since last autumn there stands on the Wittekindberg, by the Weserscharte, a monument erected to Emperor William I, of Germany, by the inhabitants of Westphalia. The site is most happily chosen, as the now competed work proves. So far as the eye can see, the scenery around presents one picture of beautiful, undefiled nature. The hill raises the monument above the level of the land around, and gives it, as viewed from the distance, a truly imposing aspect. In such a spot architecture carries more force than sculpture. The massive mouldings, the ring terrace, and the stately baldachin form one whole, which itself seems intimately to coalesce with the hill. As the eye scans the undulating lines of the surrounding expanse, it finds a natural resting place and landmark in the picturesque Wittekindberg with its monumental crown.

But let us, by the help of our illustration, approach and take a closer view of the structure. We are standing on the ring terrace, about on the spot which the architect, Prof. Bruno Schmitz, picked as the point from which to sketch his plan. Of him we will have more to say later on.

The ring terrace, we will mention in passing, is supported on twenty-eight limestone pillars, and is surrounded by a low wall.

From our place of observation we see the steps ascending toward the upper terrace. Facing us, as we scale the first flight, is the dedication, "Wilhelm dem Prossen—die Provinz Westfalen." Then the steps divide to the left and right, leading up behind the statue. This itself is raised on a simple pedestal within the baldachin. It is an excellent piece of sculpture, from the hand of Tumbusch. William is represented in his full vigor of those years in which his army gained him victory after victory. He is arrayed in the uniform of the Gardes du Corps, in his coat of arms, cuirass and high boots, girded with his mighty sword, on which he poises his left hand. The imperial coronation cloak hangs from his shoulders, and a laurel wreath crowns the brow of the victor. Thus he stands, a prince of peace, yet also a mighty protector of his people. His right hand stretches out to spread blessings and safety over his lands.

The history of the growth of the original plans for the erection of the monument into the structure such as it is completed at the present time offers some interesting features. By a small majority the house of representatives in Westphalia decided the monument should stand by the Porta Westphalica (Weserscharte) as the place best fitted of the three proposed, namely, Hagen, Münster, and the place chosen. Next a prize was offered for the best plan of a memorial, such as would be suitable for the site and purpose in view. The artist who came out victorious from this contest was Prof. Bruno Schmitz, to whom we had occasion to refer above. The merits of his design were so striking that it could be recommended for adoption by the jury almost without comment, and the provincial authorities soon decided to accept the prize-crowned plan. That was in 1890. Preliminary steps, such as the buying of the ground, etc., took a year and a half; in 1892 the building was begun; the completion of the work was celebrated in 1896, the Emperor and Empress being present.

As a matter of fact, the monument as it stands does not altogether represent the original draught; the latter is the first stage, from which the final shape was ultimately derived by a gradual evolution. Thus, for instance, the original design showed walls of smooth masonry, whereas Mr. Schmitz has built the monument in bossage work, as our illustration clearly shows. Many minor details too underwent an alteration. Of these we will only mention the substitution of the simple dedication for an elaborate bass relief coat of arms, and the temporary omission of the crouching lions on the two blocks on either side of the foot of the stairs. There was also a peculiar construction introduced in the building of the cupola which ingeniously distributes its weight on the pillars. An alteration which we cannot help regretting is the neglecting of the originally planned mosaic for the cupola, which has been inadequately replaced by whitewash. We fear this circumstance tends to detract from the majesty of the monument.

A rather comic accident, which, however, might have had serious consequences, and which as it is has left its result, is worth recording. When an exact estimate of the cost of construction was made, it was found that considerably more money would be required than the province had at its disposal, so it was agreed to reduce the dimensions of the monument by about one-third. The statue was ordered under the new measurements, and the work begun. But in the course of the erection, the architect became more and more convinced that the monument would not suffer the reduction without great loss in artistic value; he succeeded in persuading the authorities to grant him funds for the full size architectural construction. But the statue was already so far carved that in its case the reduced dimensions had to be adhered to. It was found in the end that this incongruence did not so much affect the monument as might be imagined, still the statue is a little small for its framing.

Whatever difficulties may have been in the way of the artist and his supporters, he has certainly done his work finely, and both from a close proximity and from a distance this monument offers such a view as will place it side by side with the Herrmanns-Denkmal among the notable sights which Germany calls its own. We are indebted to Zeitschrift für Bauwesen for our illustration.

THE WILLIAM I MONUMENT AT THE PORTA WESTPHALICA.

Station Announcers on the Seine Steamboats.

The Seine at Paris is navigated by a considerable fleet of cheap steamers, affording an excellent means of transportation along the water front, the fares being low and the time being fairly quick. For some weeks past a new system of announcing the stations at which the boats stop has been adopted. All travelers know the mistakes which are liable to occur owing to the carelessness with which the stops are called out. The system which is used is simple in the extreme. It consists of a box at the top of which are the words "Next Station." Below this, secured at the middle of the box, are a number of signs, one for each of the stations at which the boats call. After the boat has left the station the ticket taker pushes a button which releases the top edge of one of these signs. The sign is secured by staples at the middle of the box, so that it folds down like the leaves of a book, exposing the name of the next station. The movements are very simple and the apparatus is not liable to get out of order, owing to the fewness of the parts.

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RECENTLY PATENTED INVENTIONS.

Railway Appliances.

CAR COUPLING.—Thomas H. Smith, Bowie, Texas. This invention is for an improvement in couplings of the Janney type, providing some novel features designed to afford increased efficiency, and enabling the trainman from the side of the car to set the coupling to disconnect it from another of the same style. The construction is very simple, the coupling consisting substantially of but three main parts, which may be cast into form and used as shaped in the mould, the facility of manufacture rendering the coupling inexpensive and well adapted for general use.

CAR FENDER.—John D. Schmidt, New York City. This fender may be readily attached to or detached from either end of the car, and is of such construction that it swings to follow the track as the car passes around curves, its front portion running on pilot wheels and they being held firmly to the track at all times, so that the fender will not ride upon or over an object in the path of the car. A straight bar connected by hinges to the car platform forms the rear portion of the fender, and the pilot consists of a framework of slats or strips connected to a rear bar by chains and springs, enabling the pilot to move bodily to one side of the center of the car, allowing one side also to be pressed back nearer to the car than the other, the springs returning the pilot to its central position after the curve is passed.

Bicycles, Etc.

BICYCLE PROPELLING DEVICE.—Willis G. Calderwood, Minneapolis, Minn., and David W. Edwards, Los Angeles, Cal. While the bicycle may, according to this improvement, be propelled in the ordinary way, provision is also made for its propulsion by compressed air, single acting air pumps beneath the handle bar being operated by rocking the latter to compress air in a reservoir of moderate cross section, but which occupies the whole central portion of the frame. The handle bar is used in the ordinary way to steer the front wheel, and may be locked to prevent rocking to operate the pump, but in using the compressed air to aid the rider, a valve is opened permitting the compressed air to pass to a motor on the rear wheel, the motor having wings or blades against which the compressed air is directed.

BICYCLE BRAKE.—Charles J. Staberg and Carl J. Pihl, Brooklyn, N. Y. The brake mechanism proper of this improvement is connected with the sprocket wheel on the crank shaft, a link extending from there to a pivotal brake adapted to be pressed upon the tire of the rear wheel, such pressure depending on the force applied in back pedaling, and being released as soon as the pedals are rotated forward. The device weighs but little, is not conspicuous on the machine, and it also enables the rider to stop pedaling and coast with his feet upon the pedals without applying the brake, the pedals then being used as coasting pins.

Mechanical.

CUTTER HEAD.—George A. Ensign, Defiance, Ohio. A superior woodworking tool is provided by this invention, one more especially designed for shaping the inner sides of vehicle wheel fellies. The cutter head is made in two duplicate sections, adapted to be mounted on a shaft or on a pedestal which carries the spindle of the knife setter, an arm carrying the setting tool. The knives are so held that their cutting edges engage the work at a very effective angle, chip-breaking plates preventing the riving or tearing of cross grained stock, and there being spaces for the chips to fly readily from the cutters without clogging.

WELL PUMPING POWER.—George W. Grimes, Bluffton, Ind. A power designed to reduce the friction to a minimum, and with which a series of surrounding wells may be simultaneously pumped, is provided by this invention. The base sills are arranged in the form of a triangle, a post carrying a cap piece being extended upward from a base beam, and brackets secured to the base sills supporting sleeves, while eccentrics are mounted to rotate around the post. The pump actuating rods or lines engage ring plates on the eccentrics, and the entire construction exhibits simplicity and compactness, its rigidity adapting it for use where great strength is required.

SCREW THREAD GAGE.—Burnside E. Sawyer, Athol, Mass. This is a device consisting of a handle to the end of which are pivoted a series of toothed blades or gages adapted for insertion in small and large threaded bores or sockets, and for use in all other practically accessible places, furnishing in compact and convenient form all the pitches in ordinary use. In practice the several blades will bear numbers indicating the particular standard gages on their respective edges, the numbers running in order corresponding to the gradation of the gage teeth.

Miscellaneous.

TYPEWRITING MACHINE.—Manuel S. Carmona, Mexico, Mex. This invention provides a machine in which only five keys need be employed, and with which and the connected mechanism all the signs, letters, figures and characters used in writing may be properly brought into action, the machine being designed to operate as rapidly and with as good results as other machines which have a key for each letter or character. With the five keys ninety-three characters may be brought into action by striking one or more keys at a time, it not being necessary to look at the keys in writing at high speed, and one hand only need be used, thus allowing the hands to be used alternately. The machine is of simple construction, of small size and light in weight.

A DEVICE FOR UNITING RUBBER HOSE, ETC., TO NOZZLES AND OTHER OBJECTS.—John T. Duncan, Toronto, Canada. A split tubular spring band, according to this invention, is formed with inwardly extending beads, the band being arranged to be opened up to permit of springing it upon the hose, upon which it closes, when released, by its own resiliency, causing the beads to press the flexible material of the hose into corresponding recesses on the device on which the hose is to be fastened. There are apertures near the middle of the band and near the edges of the split to be engaged by a lever in properly opening the band and springing it upon the hose, the device being very simple and requiring but little skill on the part of the operator.

LAMP CHIMNEY.—Herbert R. Hill, Herkimer, Kansas. A chimney which may be handled without leaving finger marks on the polished glass is afforded by this invention, and the chimney may also be placed on or removed from the lamp when hot without burning the fingers. The chimney has in its base portion two opposite concavities, ground to be rough, and in these concavities are glued pads of felt, cloth, wood, or similar material.

TOASTER.—James F. Elliott, Manson, Iowa. This is a simple, easily manipulated device to facilitate toasting bread and other food products, permitting one to properly expose the article to the fire on all sides without bringing the hands uncomfortably near. The invention consists principally of a wirelike basket formed by two leaves pivotally connected to receive between them the article to be toasted, a crank shaft extending from one of the leaves to a handled frame, while a manually operated crank rod is connected with the crank arm.

ROPE LADDER.—William P. Buckley, Oxford, N. Y. This is a ladder more particularly designed for use as a fire escape, both in a permanent form, where it is attached to and made part of a building, or in portable form, to be carried by travelers for attachment to any building. The two side ropes are connected by tubular rungs through which and through each of the side ropes is passed a bolt, there being on the ends of the bolt semicircular washers to fit closely about the rope. Placed at frequent intervals on the rope are blocks of wood to hold the ladder away from the building.

PRINTING FABRICS.—George Stokes, Philadelphia, Pa. This invention is for an improved method and apparatus for preparing warp yarns for colored or pattern fabrics, more especially for tapestry and Brussels carpet, velvet and round wire. The apparatus comprises a series of sets of printing mechanisms with which the yarns contact only at a point of impression, a steam box, a bath and a drier, the yarns passing successively from one to the other, whereby different portions receive different impressions, which are then fixed, washed and dried by one continuous operation, effecting a great saving in time, labor and machinery.

ADJUSTABLE GARMENT PATTERN.—Abram O. Hancock, New Orleans, La. A chart for draughting the waists of women's dresses is comprised within the scope of this invention, which consists in a certain construction by which the pattern is adapted to universal measurements. The patterns are provided with a series of adjustably connected templets, by extending or contracting which on each other the measurement of the waist may be adjusted.

CHAIN LINKS.—William H. Griffith, New York City. Three patents have been granted this inventor for three different patterns of links formed of a single piece of wire, in the first form the end portions of the wire being shaped into interlocking eyes located substantially central between the ends of the links, the eyes being so shaped and arranged with relation to opposing abutment shoulders of the wire body that increased strain upon the chain serves to clamp tighter both extremities of the wire upon the opposing shoulders, rendering it impossible for the two ends of the wire to pull apart or become loosened and forming a chain of great strength and durability. Another form of link is of simple elliptical pattern, bent out of a single piece of wire without welding the ends, the link being a double one, of parallel folds, with the ends crossed and interlocked at one end of the link. In several forms of these links the portion where the ends of the wire are secured is designed to be swedged or drop forged in suitable dies. A third pattern of link, also of a single piece of wire, is in what is known as the figure eight pattern, made by bending to the proper shape and connecting the ends by wrapping or tying without welds; two thicknesses of wire lie in the fork of each loop and one thickness of wire lies in each obtuse angle on the outside between the loops, forming a very compact knot and making a strong link in which the ends are secured by double and symmetrically arranged wraps.

Designs.

BICYCLE RACK.—Adelbert O. Blethen and William J. Evans, Minneapolis, Minn. The upright of this rack is of bottle or demijohn shape, with elongated openings in its lower portion, horizontal side members extending up a short distance from the base, there being near the top of the upright panels for labels, etc.

HAT PIN.—Mary A. E. Hackett, New York City. This pin is formed with a long and a short straight portion, and intermediate bow or arch portion, enabling it to be readily passed through the hair and yet retained therein, being entered into the hat at opposite sides.

NOTE.—Copies of any of the above patents will be furnished by Munn & Co. for 10 cents each. Please send name of the patentee, title of invention, and date of this paper.

NEW BOOKS, ETC.

THE HYDRAULIC GOLD MINER'S MANUAL. By T. S. G. Kirkpatrick. With illustrations. Second edition, revised and enlarged. London: E. & F. N. Spon, Limited. New York: Spon & Chamberlain. 1897. Pp. 46. Price $1.

This work was originally intended to convey information on mining elevated banks by means of hydraulic pressure, but as much attention has been attracted to river and placer mining, much has been added to this new edition which will be found useful to those who embark in the latter kind of mining. A short table of gems and precious stones which commonly accompany gold in river beds is appended. The work appears to be a practical one, and the main facts are modified, though the circumstances remain the same for the treatment of auriferous sands from whatever source they are derived.

"WORK" HANDBOOKS. A series of manuals. By Paul N. Hasluck. London and New York: Cassell & Company. About 150 pages each. Price 40 cents each.

For practical instruction in numerous mechanical or art technical pursuits, these convenient little handbooks cover a wide field. They are fully illustrated, the descriptions of methods and means and tools employed for doing the work considered in each volume are brought fully up to date, and all in language so plain and simple that any youth or the most uninformed workman may readily educate himself to do the work described. The titles of the different volumes are: "Wood Finishing—staining, varnishing, polishing;" "Boot Making and Mending—repairing, lasting, and finishing;" "How to Write Signs, Tickets, and Posters;" "Cycle Building and Repairing;" "Dynamos and Electric Motors;" "House Decoration—painting, whitewashing, etc." There is not a person of average intelligence who could not in a short time learn how to make a living from consulting one or more of these volumes, and every one may learn from them better how to do the numerous small jobs which, sooner or later, come to most people to do.

SCIENTIFIC AMERICAN BUILDING EDITION

OCTOBER, 1897.—(No. 144.)

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1. Handsome engravings, showing the exterior of the Corcoran Art Gallery at Washington, D. C., erected from designs of Mr. Ernest Flagg, architect, New York City.
2. Summer cottage at Manchester-by-the-Sea, Mass., recently erected for Frederick W. Dorr, Esq. An attractive design treated in the pure Colonial style. Two perspective elevations (one in colors) and floor plans. Mr. B. E. Taylor, architect, Boston, Mass.
3. A modern residence at Richmond Hill, L. I., recently erected for Mr. Roth, at a cost of $5,500 complete. Perspective elevation and floor plans. A design with many excellent features. Mr. H. E. Haugaard, architect, Richmond Hill, L. I.
4. Colonial residence at Montclair, N. J., recently erected for Isaac N. Rudges, Esq., at a cost of $10,000 complete. Perspective elevation and floor plans; also an interior view. Mr. Christopher Myers, architect, New York City.
5. Perspective elevation and floor plans of some modern houses at Binghamton, N. Y., recently erected for G. N. Balcom, Esq., at a cost of $2,000 complete. An attractive design. Mr. A. H. Doolittle, architect, Binghamton, N. Y.
6. Suburban residence at Overbrook, Pa., recently erected for Charles Scott, Esq. Two perspective elevations and floor plans. A design treated in the English style, half stone and timber, with many excellent features. Mr. W. L. Price, architect, Philadelphia.
7. Suburban dwelling at Newark, N. J., recently erected for James Cadmus, Esq. A pleasing design in the Colonial style. Perspective elevation and floor plans.
8. Modern dwelling at Prohibition Park, S. I., recently erected for Albert Wadhams, Esq., at a cost of $3,000 complete. Two perspective elevations and floor plans. An attractive design for a suburban dwelling. Mr. John Winans, architect, Prohibition Park, S. I.
9. A cottage at Chevy Chase, Md., recently erected for L. D. Meline, Esq. An attractive design, simple in treatment and pleasing in appearance. Architect, L. D. Meline, Chevy Chase, Md. Perspective elevation and floor plans.
10. A residence at Prohibition Park, S. I., recently erected for Frank Burt, Esq. Perspective elevation and floor plans; also an interior view. A pleasing design, with many excellent features. Mr. John H. Coxhead, architect, Buffalo, N. Y.
11. A gambrel roof cottage at Newton Centre, Mass., recently erected for Messrs. Alvord Brothers. Perspective elevation and floor plans. An artistic design. Mr. Charles L. Isenbeck, architect, Boston.
12. Miscellaneous Contents: The overproduction of tall office buildings.—Concerning Colonial architecture in New York.—Old Colonial ironwork, illustrated.—Ventilation of gas-heated rooms.—An efficient steam saver, illustrated.—Improved weather strips, illustrated.—Artistic hardware, illustrated.—New parlor door hanger, illustrated.—An ingenious color combination chart.—"Colophite."—A refrigerator for private residences, illustrated.

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(7217) G. G. S. asks: A cast iron ring has a cross section 1½ inches in diameter. The length of the axis of the cylindrical ring is 36 inches. How many ampere turns will be required to drive 50,000 lines of force through it? A. 1080 ampere turns. 2. Suppose there are 450 turns on it, how many amperes must be driven through the coil? A. $2{\cdot}4\ \frac{1080}{450}=2{\cdot}4$. 3. What progress has been made in the production of electricity direct from coal? A. No progress by burning the coal. By chemical action in a cell electricity has been generated from carbon, as a laboratory experiment, but not commercially. See articles in SUPPLEMENT, Nos. 629, 826, 1016, 1072 and 1107, price 10 cents each prepaid by mail.

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(7219) G. A. H. asks: Will you give the solution and explanation of the following? Find the radius of a sphere having a capacity of one farad, having given the ratio of the electrostatic to the electromagnetic system as 3×10^{10} cm. A. The capacity of an isolated sphere, i. e., a sphere so far removed from other bodies as to be unaffected by them, is equal to its radius in centimeters when that capacity is expressed in electrostatic units on the C. G. S. system. The capacity of the earth is about 630,000,000 electrostatic units, or about 700 microfarads. A sphere, whose capacity is 1 farad, is then to the earth in the ratio of 1,000,000 to 700, a number easily calculated, since the radius of the earth at the equator is about 638,000,000 centimeters. See "Lessons in Electricity and Magnetism," by Silvanus P. Thompson, $1.50, pp. 257, 345, 352. The mathematical demonstration is far too long for Notes and Queries. See any good work on the theory of electricity—Nipher's "Electricity and Magnetism," Cumming's "Theory of Electricity."

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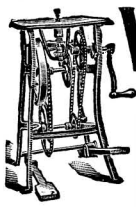

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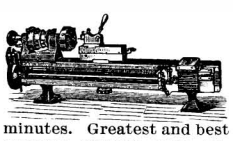

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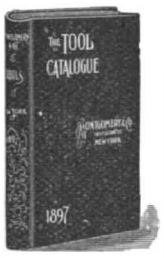

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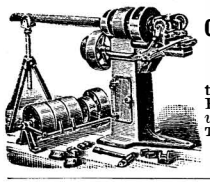

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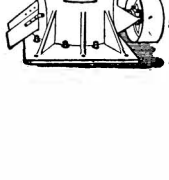

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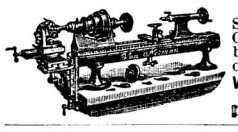

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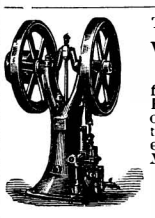

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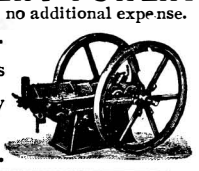

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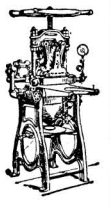

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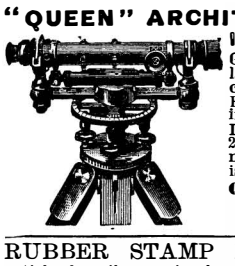

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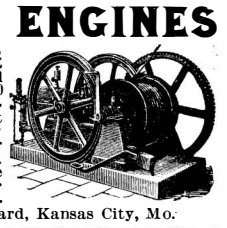

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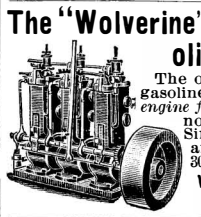

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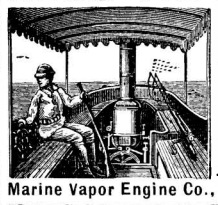

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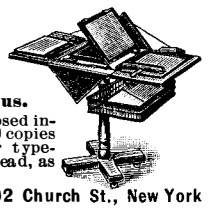

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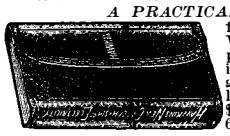

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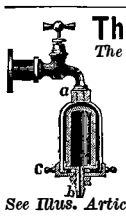

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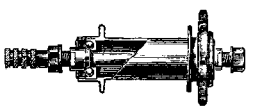

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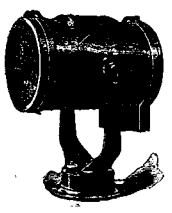

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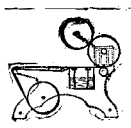

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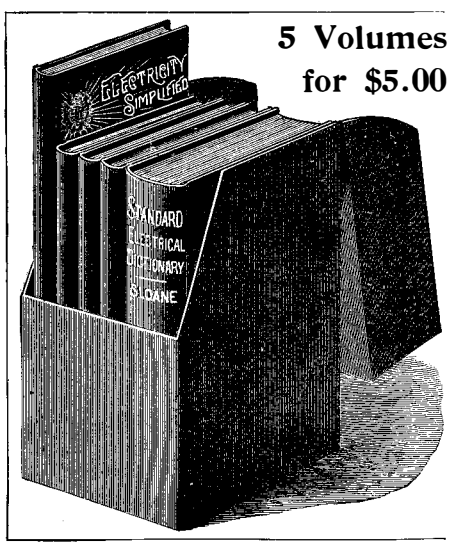

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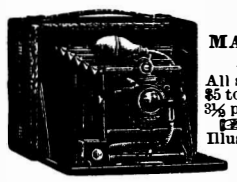

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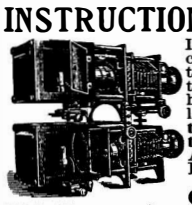

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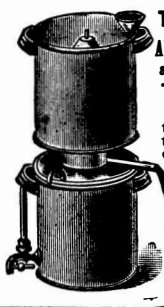

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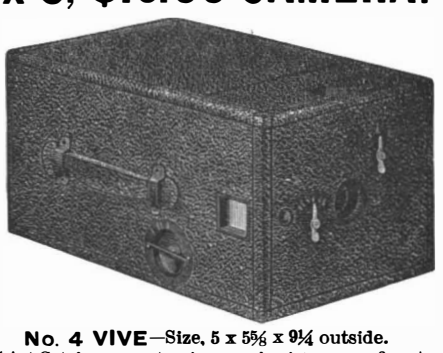

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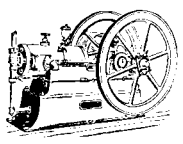

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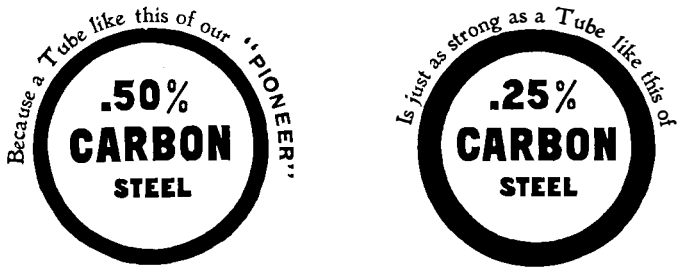

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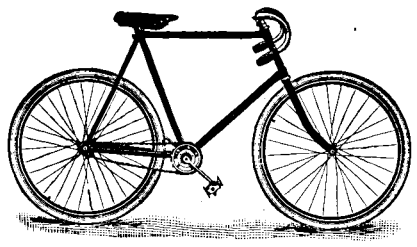

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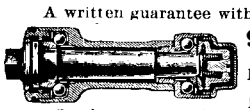

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